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Introduction

The purpose of this Direct Seeding Handbook is to establish guidelines for the who, what, when, where, how, and how much as relates to seeding directly nuts and seeds to establish a variety of hardwood tree species.

The intent of this handbook is to provide practical information that allows for local modification and input. It may be necessary for the user to read or collect needed information from reference materials provided. It is the intent of the primary developers to borrow from existing knowledge to the fullest extent and to broaden the scope of contents only when local users require further information.

Modifications and improvements will be considered annually, but they will be the result of local requests or a need for more exacting technical information in line with policies and procedures of the Illinois Department of Natural Resources, Division of Forest Resources or the USDA Natural Resources Conservation Service (NRCS).

This handbook provides the basics for successful direct seeding of a variety of forest species. Direct seeding is presented as another tool, together with seedling tree planting, for achieving high-quality stands of hardwood trees.

DIRECT SEEDING SUBCOMMITTEE

of the Association of Illinois Soil and Water Conservation Districts (AISWCD) Forestry Committee

Bob Sloan AISWCD Forestry Committee Chair

RR1, Box 152 Washburn, IL 61570 Phone: 309/246-8391 email: rsloan@joysta.com

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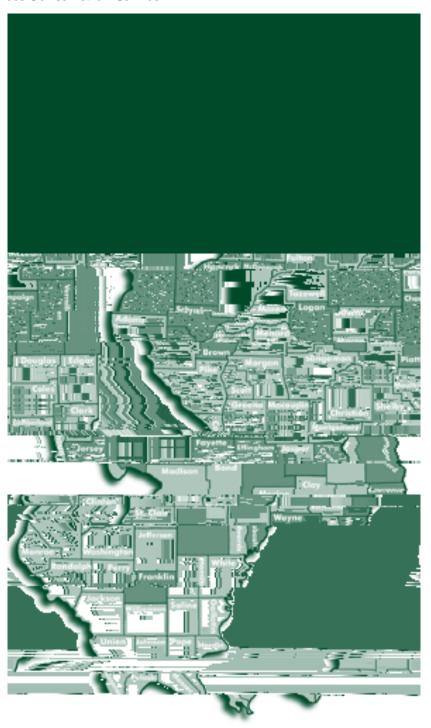
Tom Ward, Agroforester USDA-Natural Resources Conservation Service

2118 W. Park Court Champaign, IL 61821

Phone: 217/353-6647, fax -6678 email: tom.ward@il.usda.gov

SWCDs Promoting Direct Seeding

SWCD/ NRCS Field Offices involved in direct seeding are indicated with darker shading. This map is current as of May 2002. Prepared by the Natural Resources Conservation Service.



DIRECT SEEDING COORDINATORS

These individuals have a high level of interest in making direct seeding of woody species happen locally and statewide. These individuals are willing, ready, and able to tackle this activity because of current knowledge or ability to learn new skills. These individuals will typically be Resource Conservationists or other persons who work for or with the local Soil and Water Conservation District (SWCD).

Direct Seeding Coordinator Responsibilities

- Acts as first level of contact locally.
- Is knowledgeable of direct seeding techniques, local

DIRECT SEEDING TECHNICAL CONTACTS

These individuals have a high level of interest in making direct seeding of woody species a common occurrence in their county or district. They will generally be individuals with strong technical backgrounds in forestry or forestry related activities. These individuals will typically be District Foresters, District Conservationists, or other professionals proficient with programs and activities related to direct seeding. These persons will be in direct or regular contact with the Coordinator.

Technical Contact Responsibilities

- Provides guidance and/ or training to the Coordinator.
- Provides technical support for program funded or individually initiated direct seeding activities, i.e. develops conservation plans, forest management plans, planting plans, etc. needed to assure successful direct seeding activities.
- Develops with others local seed quality criteria and provides this information to local collectors.
- Communicates with appropriate Foresters (IDNR, District or State level, or NRCS Agroforester) on direct seeding issues when guidance is needed.
- Follows state level guidance (standards, handbook, published reference lists, etc.) for carrying out direct seeding activities or obtains a variance.

- Reviews Direct Seeding Handbook and other guidance materials and offers suggestions and comments for improvements.
- Helps contractors and others to improve equipment and ability to establish forest plantations by direct seeding.
- Talks with Coordinator regularly during busy seasons (collecting, planting, follow-up) to assure quality criteria are followed.
- Determines, schedules, and completes training needs in a timely manner.

Brown County Todd Reische

Jersey County

Jacquie Simon DC, SWCD 604 E. Franklin Jerseyville, IL 62052-9701 Phone: 618/ 498-6836 ext. 3 email: Jeoquie.Smon@il.usda.gov

Jo Davia 0.63 sunty

Lee County

Brenda Merriman RC, SWCD 319 S Mæon Avenue Avenue Amboy, IL 61310 Phone: 815/857-3623 ext. 3 email: BrendaMerriman@il.usda.gov

Logan County

Steve Bracey RC, SWCD 1650 5th Street Road Lincoln, IL 62656 Phone: 217/735-5508 email: Steve.Bracey@il.usda.gov

Marshall-Putnam

Randy Edwards DC, USDA-NRCS 429 University Henry, IL 61537-9764 Phone: 309/ 364-3913 email: Randy.Edwards@il.usda.gov

McDonough County

David King

RC&D Coordinator Prairie Hills RC&D Inc. 321 University Drive Macomb, IL 61455 Phone: 309/ 833-4747 email: David.King@il.usda.gov

Piatt County

Abbie Sperry RC,SWCD 4005 Bear Lane Monticello, IL 61856 Phone: 217/762-2571 ext. 3 email: Abbie:Sperry@il.usda.gov

DIRECT SEEDING COORDINATORS & TECHNICAL CONTACTS BY COUNTY

COORDINATORS

TECHNICAL CONTACTS

Schuyler County

Larry Shelts RC, SWCD RR 4, Box 290

Rushville, IL 62681-0290 Phone: 217/322-3359 ext. 3

email:

Larry.Shelts@il.usda.gov

Matt Peterson

District Forester, IDNR

P.O. Box 406 Havana, IL 62644 Phone: 309/543-3401

mpeterson@dnrmail.state.il.us

Vermilion County

Resource Conservationist SWCD

1905-A US Route 150 Danville, IL 61832

Phone: 217/442-8511 ext. 3

Jay Hayek

District Forester, IDNR

301 South Date Street Gibson City, IL 60936 Phone: 217/784-4730

email:

jhayek@dnrmail.state.il.us

Wabash County Charles Trimble RC, SWCD

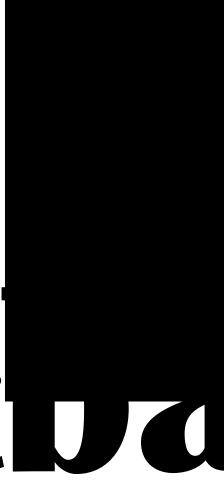
219 W. 9th Street Mt. Carmel, IL 62863 Phone: 618/262-4962

email:

Charles:Trimble@il.usda.gov

Clint Patterson





LIST OF COUNTY CONTACTS

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Name	Address	Telephone, E-mail	Resource Provided
			-
			_
			-
			_
			_

LIST OF COUNTY SUPPORT PERSONS

People who can support seed collection and direct seeding in various ways.

Name	Address	Telephone, E-mail	Resource Provided
			_

- *Direct Seeding. Nov. 1999, Iowa Forestry Extension Note F-363. Wray, P.H., G. Beyer, and S. Tate. 2 pp.
- *Direct Seeding. 1998, One-Stop Forestry, Postville, IA. 3 pp.
- *Direct Seeding Hardwoods on the Cache River Joint Venture. 1997. Maginel, D. and M.D. Hutchison. The Nature Conservancy, Ullin, IL. 3 pp.
- **Growing Illinois Trees From Seed.** 1983. Circular 1219. C.E.S., College of Agriculture, University of Illinois, Urbana-Champaign. 32 pp.
- "Growing Illinois Trees from Seed." Spring 1996, Mike Bolin. IL Steward Magazine, 6 pp.
- **Guide to Regeneration of Bottomland Hardwoods.** 1992. GTR-SE-76. USDA-Forest Service, SE For. Exp. Sta., Asheville, NC. 35 pp.
- * "Nuts to Forestry: New Technology for New Forests." Mar.-April 1996, Stan Tate. *Iowa Conservationist*, 5 pp.
- Oak Regeneration: Serious Problems, Practical Solutions.

Chapter 2 Overview of Direct Seeding

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This section provides contacts in and out of Illinois who have experience with successful seeding projects. Call them to "talk out" any particular aspect of planning, collecting, planting or establishing direct seeded tracts.

Illinois

Contact name	Location and Telephone Number	Type of activity
Mark Cender	NRCSSoil Conservation Technician, Champaign, IL 217/377-9740	direct seeding
Steve Felt	IDNR District Forester, Cambridge, IL 309/937-2122 email: sfelt@dnrmail.state.il.us	direct seeding (mostly walnut)
Ken Hoene	Timber Services RR 1 Box 247A Shelbyville, IL 62565 217/ 774-5611	direct seeding, seed collection, seeding equipment
Jeff Hudgens	Prairie Hills Forestry Consulting 321 University Drive Macomb, IL 61455	direct seeding, seed collection, seeding equipment

Adjoining States

Contact name	Location and Telephone Number	Type of activity
Steve Bertjens	RC&D Coordinator, Platteville, WI 608/348-3235 Steve.Bertjens@wi.usda.gov	seed collection, direct seeding
Gary Beyer	IA DNR Forester, Charles City, IA 515/228-6611 email: Gary.Beyer@dnr.state.ia.us	seed collection, broadcast seeding
Larry Krotz	Tree Farmer, Washington, IA 319/653-4959 email: lkrotz@lisco.com	seed collection, high volume seeding
John Olds	One Stop Forestry P.O. Box 916 Postville, I A 52162-0916 319/ 864-3586 or -7112, fax -7113	seed collection, broadcast seeding
Larry Owen	Consultant, Terre Haute, IN 812/466-4445 website: www.forest-management.com email: Larry@forest-management.com	direct seeding
Bob Petrzelka	Geode Forestry 3002A Winegard Drive Burlington, I A 52601 319/ 752-2291 email: bpivo@lisco.com	seed collection, row seeding, equipment
John Seifert	Purdue Univ., Butlerville, IN 812/458-6978, fax -6979 purfor@seidata.com	herbicides
Stan Tate	IA DNR Forester, Wapello, IA 319/523-2216 email: Stanley.Tate@dnr.state.ia.us	seed collection, equipment, row seeding

OPPORTUNITIES AND CHALLENGES

This section lists some important considerations as you begin the process of planning with individuals interested in direct seeding. The listings under Opportunities and Challenges are not all-inclusive, but should provide "food for thought" items to help you avoid pitfalls or stumbling blocks as you proceed with collection, planting and establishment.

Opportunities

- As long as there is adequate soil moisture, direct seeding can take place in any season.
- Direct seeding offers the potential for reduced costs compared to seedling planting.
- Direct seeding is often faster and can cover more acres than other kinds of
 - dur Dir ecice exelentification in the first of the firs

Challenges

n Residual chemicals, late freezes, poor species to site matching, animal damage, flooding with high

This section provides the tried and tested components that most often result in successful nut and seed plantings. Many of these key points are listed in the published articles identified later in references. There are four (4) essentials to follow for increasing the chances of success:

Items that will make direct seeding successful:

•

REFERENCES

- *Direct Seeding. Nov. 1999, Iowa Forestry Extension Note F-363. Wray, P.H., G. Beyer, and S. Tate. 2 pp.
- *Direct Seeding. 1998, One-Stop Forestry, Postville, IA. 3 pp.
- *Direct Seeding Hardwoods on the Cache River Joint Venture. 1997. Maginel, D. and M.D. Hutchison. The Nature Conservancy, Ullin, I.L. 3 pp.
- **Growing Illinois Trees From Seed.** 1983. Circular 1219. C.E.S., College of Agriculture, University of Illinois, Urbana-Champaign. 32 pp.
- Growing Trees from Seed. Spring 1996, Mike Bolin. IL Steward Magazine, 6 pp.
- * "Nuts to Forestry: New Technology for New Forests." Mar.-April 1996, Stan Tate. *Iowa Conservationist*. 5 pp.
- Seed Collection Manual. circa 1980. Illinois Department of Natural Resources, Division of Forest Resources. 23 pp.
- "Seven Rules for Direct Seeding Success." Personal Communications from Stan Tate, Iowa DNR, Forestry Division, Wapello, IA.

NOTE: Copies of all of the above are available for up to a 2-week loan from the NRCS State Agroforester. Some references may also be available from IDNR District Foresters, the IDNR Forest Management Staff Forester, and the State Cooperative Extension Forester.

^{*}Copy provided in Appendix of Direct Seeding Handbook.

SPECIES LISTS AND SPECIES R

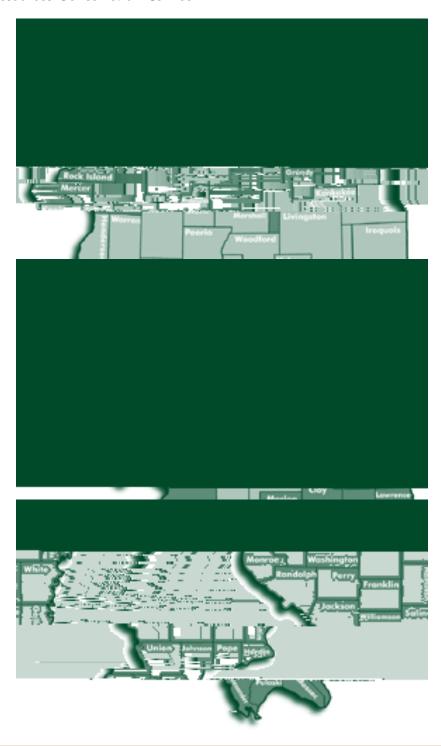


This chapter is devoted to essential information about the most common trees used for direct seeding in Illinois. Species appropriate for

PLANT SUITABILITY Z Z ZABILITY

These broad zones are based on certain plant growth factors including average January-July temperatures, frost-free days, and annual rainfall.

These zones are used as a guide in selecting grasses, legumes, shrubs, trees, and vines for planting in Illinois. This map is provided by the USDA-Natural Resources Conservation Service.



SPECIES LISTS

This section identifies species best adapted to bottomland (riparian) soils or upland soils. It is essential to match the species with the site conditions. In planning, consider soils, aspect, slope, wetness, extent and frequency of flooding or ponding, and other site conditions to determine which species to plant. Most of this information is in the species reference sheets.

Bottomland Species

Listed and grouped from species appropriate for *highest, best drained sites to those adapted to the lowest, most poorly drained sites.* Shaded boxes indicate groups that have similar requirements and can be planted together.

Common Name	Scientific Name	* <u>Planting Zone</u>
Black walnut	Juglans nigra	ALL
Shellbark hickory	Carya laciniosa	ALL
Shumard oak	Quercus shumardii	11,111
Cherrybark oak	Quercus pagoda	11,111
Swamp chestnut oak	Quercus michauxii	11,111
Pecan	Carya illinoensis	ALL
Persimmon	Diospyros virginiana	ALL
Bur oak	Quercus macrocarpa	ALL
Bitternut hickory	Carya cordiformis	ALL
Shingle oak	Quercus imbricaria	ALL
Nuttall oak	Quercus texana	III
Green ash	Fraxinus pennsylvanica	ALL
Swamp white oak	Quercus bicolor	ALL
American sycamore	Platanus occidentalis	ALL
Pin oak	Quercus palustris	ALL
Willow oak	Quercus phellos	Ш
Water hickory	Carya aquatica	III

Common Name	Scientific Name	* <u>Planting Zone</u>
Overcup oak	Quercus lyrata	11,111
Baldcypress	Taxodium distichum	11,111

^{*} See planting zone map on page 3-3.

Upland Species

Common Name	Scientific Name	Planting Zone *
Black walnut	Juglans nigra	ALL
White oak	Quercus alba	ALL
Black oak	Quercus velutina	ALL
Red oak	Quercus rubra	ALL
Bur oak	Quercus macrocarpa	ALL
Shingle oak	Quercus imbricaria	ALL
Chinkapin oak	Quercus muehlenbergii	ALL
Bitternut hickory	Carya cordiformis	ALL
Mockernut hickory	Carya tomentosa	ALL
Pignut hickory	Carya glabra	ALL
Shagbark hickory	Carya ovata	ALL
Persimmon	Diospyros virginiana	ALL
White ash	Fraxinus americana	ALL
Black cherry	Prunus serotina	ALL
Tuliptrœ	Liriodendron tulipifera	ALL

^{*} See planting zone map on page 3-3.

SPECIES REFERENCE SHEETS

This section contains a species reference sheet for each of the species listed on pages 3-4 through 3-5. These references are intended primarily for the purpose of tree identification. For more detailed information on seed maturity, collection, extraction, handling, storage and germination, refer to Chapters 5 and 6.

This section is arranged alphabetically by genus and then alphabetically by species according to common name rather than scientific name since many users may not know scientific names.

Handbook users may add locally important species, but new reference sheets should follow the current format to achieve consistency.

Planners might want to copy the appropriate sheets for landowner use. Readers of this handbook are urged to acquire copies of listed references to glean more detailed data about a given genus or species. For more tree identification information and images, visit the USDA PLANTS database at http://plants.usda.gov/plants.

REFERENCES

- Missouri's Oaks and Hickories. Reprint 994. Edgar Denison and Bruce Palmer. Missouri Department of Conservation. Images reprinted with permission, Missouri Conservation Commission. Available on the Web at: www.conservation.state.mo.us./ forest/landE/oak_hickory.
- **Seed Collection Manual.** Circa 1980. Illinois Department of Natural Resources, Division of Forest Resources. 23 pp.
- **Seeds of Woody Plants in the United States.** 1974. Agricultural Handbook No. 450. USDA-Forest Service. 883 pp. Available on the Web at: http://wpsm.net/.
- **Seeds of Woody Plants in North America.** 1992. Young, JA. and C.G. Young. Dioscorides Press. 407 pp.
- Silvics of North America, Vol. 1, Conifers and Vol. 2, Hardwoods. 1990.

 Agricultural Handbook 654. USDA Forest Service. Vol. 1, 675 pp. Vol. 2, 877 pp. Available on the Web at: http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table of contents.htm.
- **Trees of Missouri**. Reprint June 1979. Settergren, Carl and McDermott, R.E., University of Missouri-Columbia, Agricultural Experiment Station. Available on the Web at: http://www.conservation.state.mo.us/nathis/plantpage/flora/motrees/index.htm.
- USDA PLANTS database. USDA, NRCS 1999. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Available on the Web at: http://plants.usda.gov/plants.

Photographs and Illustrations:

Unless otherwise referenced, all tree identification photos included in the Species Reference Sheets are provided courtesy of John M. Edgington, Dendrologist, Department of Natural Resources and Environmental Sciences, University of Illinois Urbana-Champaign.

Photographs were also provided courtesy o

CHAPTER 4 ORGANIZING FOR LOCAL COLLECTION

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♦ Local Tree Experts	4-4
♦ Collectors outside the County	4-5
♦ Seed Needs	4-5
 Forecasting the Potential Seed Crop 	4-8
◆ References	4-9

LOCAL COLLECTORS

The following space is reserved to record local collectors.

Collector List for	County,	Illinois				
Copy this form and keep the original in your binder.						
Name (individual or group)	Address	Telephone, E-mail				

This section is important for identification and location of trees and shrubs for future seed collection.

Record in the space below those individuals who are:

- 1) technically capable;
- 2) willing to help;
- 2)

SEED NEEDS

Seed Needs for Fall or Spring Direct Seeding -	Copy this form and keep the original in your handbook.
County, Illinois	

Cooperator Name	Address	Telephone	E-mail	and Tract Number	Acres	Acres Species Pounds	Pounds

SEED NEEDS

opy this form and keep the original in your handbook.

County, Illinois Seed Needs for Fall or Spring Direct Seeding - _

Pounds						
Species						
Acres						
Farm and Tract Number						
E-ma il						
Telephone						
Address						
Cooperator Name						

This section explains what to look for when forecasting local seed crops and determining whether the local crop will meet local needs. Spring weather sets the tone of what might be expected relative to seed set and normal development.

Most tree species do not develop and drop abundant seed crops each year.

- **Conservation Trees and Shrubs.** Pocket ID Guide. National Association of Conservation Districts. Available at (800) 825-5547 x 32 or www.nacdnet.org.
- Forest Trees of Illinois. Illinois Department of Natural Resources, Division of Forest Resources.
- Missouri's Oaks and Hickories. Reprint 994. Edgar Denison and Bruce Palmer. Missouri Department of Conservation. Images reprinted with permission, Missouri Conservation Commission. Available on the Web at: www.conservation.state.mo.us/forest/landE/oak_hickory.
- Summer Tree Finder. May Watts. Available from the Nature Study Guild, Box 10849, Rochester, NY 14610 or phone 1-800-954-2984. Cost is \$3.00 Order from the Tree Farm Committee by sending an email to: msiemert@dnrmail.state.il.us. Also available on the Web at:

 Mæmert@dnrmail.stM5ww



CHAPTER 5 COLLECTING THE SEEDS

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 Quality Criteria for Collecting 	5-2
 When, Where and How of Woody Seed and Nut Collection: 	5-3
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WHEN, WHERE AND HOW OF WOODY SEED AND NUT



Pecan

Persimmon

Sycamore

Normal Seed Maturity

Fruit ripening occurs from September to October. Once husks change color and begin to split, seed is mature.

Normal Seed Maturity

The fruits ripen from September to November. Mature fruit is yellow, orange or yellowish-brown in color and slightly soft to firm to the touch.

Normal Seed Maturity

Fruiting heads of American sycamore mature after they turn brown, usually mid to late October. Seed balls (fruiting heads) occur heavily every other year, with some occurrence every year.

Quality Collection Sites

Collect seed in bottomland areas where mowing occurs, generally near levees, in fencerows, in cropped fields, in parks, or along roads where specimen trees are accessible.

Quality Collection Sites

Collect seed any place that specimen trees or groves of trees develop plump, full fruits, typically at woodland edges, in fencerows, along crop fields, and in odd, densely shaded areas. Look on sandy, dry soil sites or bottomlands.

Quality Collection Sites

Look for open-grown trees planted as ornamentals in lawns, parks and other maintained areas. Also try field-woodland interface areas, in pastures, and along creek banks.

Methods of Collection

Nuts can be collected from the ground using a bag-a-nut after natural seed fall or after shaking or flailing limbs. Catch nuts on ground cloths.

Methods of Collection

Gather fruits from the ground when soft or pick directly from trees when fruit is orange and becomes soft. If local individuals process fruit into pulp, arrange to have the seed saved. Spreading a net or tarp on the ground and shaking limbs can be very effective.

Methods of Collection

Balls can be collected from mid-October until spring. Seed collected from trees or ground in late winter has been stratified naturally, but many seed balls may have shattered and make collection impossible. Collect from the ground or directly from the trees.



Assuring Seed Quality

This subsection is provided to help assure that any seed collected is properly handled before planting. The points stressed here will help maintain and/or improve the quality and viability of the seed collected or purchased for immediate planting or for later planting after storage and stratification.

The first opportunity to assure high seed quality occurs at collection. Careful scouting will eliminate collecting from sites that yield poor quality seed. This section will provide the essentials for processing collected seed.

Cleaning, processing, bagging, handling, storage, and tagging lots will be covered. All the species discussed in the previous subsection will be covered. Some repetition will be noted in Chapter 6, which covers in more detail some of these same subjects.

Key Points

- 1. Early seed drop is suspect and often has low viability compared to later collections.
- If a variety of species are to be planted, be advised that all the species are not likely to fall and be available at the same time.
- Do not delay or postpone these activities.
- 4. Keep nuts and fruits collected in a cool, protected place, out of direct light.
- Organize seed processing area for efficient use.
- Do not let seeds and nuts dry out or heat up before processing.
- 7. Watch out for excessive heat generation and mold formation. Avoid tall stacks.
- 8. Tag or label all bags of species and lots individually and maintain separation.

Specific Points

Ash

Place in shallow trays in ventilated areas to dry. When dry, crush and separate seed from debris. Sow about ½ inch deep before the end of October, if possible. If storing, place in dry closed containers and place in cooler at 40°F until planted.

Baldcypress

Collection should be complete by early November. Place cones in an area that is protected with good air flow and let cones thoroughly dry. Shred or break cones by trampling. Remove coarse debris. Seed and remaining fine debris can be scattered where desired if the soil is loose enough to accept seed. Store any seed to be planted later as uncrushed dry cones in boxes or burlap bags at low temperatures but above freezing until planting. Crush, separate and seed as described above.

Black Cherry

Immediately after collection, crush and mash fruits through a wire mesh to separate seeds from skins and pulp. Wash seed into a shallow box. Rub as you wash. Seed to be used within a few weeks or months should only be surface dried (a few hours), then bagged in sealable plastic bags and placed in a cooler until planted.

Seed to be stored over winter should be dried at room temperature only about 1 day. Place in 4 mil sealable bags and lay flat in a cooler at about 40°F. Check and rotate bags occasionally to be assured seeds are not molding. Seed can be surface spread fall or spring in areas * 0.00779descriting. Crush, * 0a -13.2ntilated Iromeand

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group not planted the next spring or early summer

Tuliptree Yellow-Poplar

Complete cones or seed collected by shaking will not be completely dry and should be placed in shallow trays to finish drying. Rub cones after completely dry to break apart. Fall seed or store dry in sealed bags or cans at about 40°F.

Black Walnut

After collection, place seed in burlap or onion sacks to transport. Keep cool and out of sun. If the nuts will be hulled, be sure to complete before the hulls dry. Old corn shellers or mechanical hullers can be used. Float and wash hulled nuts. Spread to dry or fall plant 2 to 4 inches deep. Stored walnuts should be treated the same as the hickories (see above). Be advised that unhulled nuts will eventually decompose and produce a black liquid that will stain anything it contacts.

REFERENCES

- **Growing Illinois Trees From Seed.** 1983. Circular 1219. C.E.S., College of Agriculture, University of Illinois, Urbana-Champaign. 32 pp.
- **Seed Collection Manual.** Circa 1980. Illinois Department of Natural Resources, Division of Forestry Resources. 23 pp.
- Seeds of Woody Plants in the United States. 1974. Agricultural Handbook No. 450. USDA-Forest Service. 883 pp. Available on the Web at: http://wpsm.net/OR
- **Seeds of Woody Plants in North America.** 1992. Young, JA. and C.G. Young. Dioscorides Press. 407 pp.

NOTE: Copies of all of the above are available for up to a 2-week loan from the NRCS State Agroforester. Some references may also be available from IDNR District Foresters, the IDNR Forest Management Staff Forester, and the State Cooperative Extension Forester.



Introduction

Regardless of the source of seeds or nuts—local collections, another District, other in-state collector, or an out-of-state supplier—a local plan will be needed for buying (and selling), handling, storing, and transportation.

This chapter will provide the basics for addressing these issues on a statewide basis. It is hoped that SWCD's will view direct seeding as a way to help cooperators complete their conservation plans and provide an opportunity for the SWCD's to gain additional income for their overall program.

As SWCD's develop their seed collection programs, it is hoped that a networking arrangement can be set up. Eventually, a single statewide price list could be developed annually. Storage facilities could be located and shared regionally.

Handling, transportation and storage must be carried out under a set of uniform guidelines to assure that the quality of seed collected and purchased remains high until it is planted. Subsections that follow will expand on these issues. This chapter will include a section on quick tests to assure seed quality. Included are several key references. The Appendix will include price lists to guide purchase of nuts and seeds (updated annually), lists of collectors (whether local, in-state, or out-of-state) and, if available, lists of storage locations with cost of rental.



HANDLING AND STORAGE REQUIREMENTS BY SPECIES

Proper handling and storage is essential for keeping high quality seed viable, whether for a short time or an extended period. This section is developed for the species that are listed in Chapter 3. Other locally important species may be added. The references listed may be used to help you obtain any pertinent information needed for additional species.

Determine how seed was handled and stored before purchase. An advantage to local seed collection is the ability to control handling and storage.



General Rules of Thumb

- 1) Tag or label all seed bags to indicate date, location of collection, species of seed, weight, and name of collector.
- 2) Plant as soon after collection as possible, particularly the white oak family.
- 3) Most nuts and seeds should be kept cool and moist.
- 4) Float, sort and cull to reduce volume immediately after collection.
- Dry or soak and bag as directed by the following species criteria.
- 6) Most species will need a period of "stratification" (covered later) to cause seed to break dormancy if not fall seeded.
- 7) The longer stored, the greater the loss of viability.

Baldcypress

Handling

Spread cones in trays to dry.
Once dry, break cones apart by flailing or trampling.
Separation of cone fragments from seeds is very difficult, and they are usually sown together.

Storage

Store dry at about 40°F if not fall seeded.

Stratification

Spring seeded baldcypress needs pregermination treatment. Soak the seeds in water at about 40°F for 90 days or use 90 days of cold stratification preceded by a 5 minutes soak in ethyl alcohol.

Black Cherry

Handling

Place in shallow trays. Rub and wash to separate skins and pulp from seeds as soon after collection as possible to avoid heating and molding. Do not dry excessively.

Storage

Persimmon

Handling

Place collected fruit in shallow trays that have a 1/4 inch mesh hardware cloth

Sycamore

Handling

The seed balls should be placed in trays to dry, after which the seed may be phe

a

Tuliptree Yellow-Poplar

Handling

Cones should be placed in shallow trays to dry 7 to 20 days. Once dry, use any practical method to break apart the cones and separate the seed from debris.

Storage

Seal dry seed and store in the refrigerator at about 40°F or store in moist sand at 36°F.

Stratification

Cold moist stratification in plastic bags at 36°F for about 140 days works well to break dormancy.

Black Walnut

Handling

If hulls are to be removed, do so before they dry.
Remove by hand, foot, corn sheller, or other safe mechanical method. Place in container, pressure wash, float off bad nuts, and then spread to dry. Nuts can be planted with hulls on but are more bulky and difficult to work with. Keep in a cool area protected from rodents.

Storage

It is best to fall plant because of bulk. If storage is necessary, use an outdoor pit where nuts can be spread, buried under about 2 feet of soil and straw, and stored over winter. Protect stored area from predators by endosing with wire mesh. Cover the wire mesh with a paper or doth barrier to facilitate retrieval in spring. Walnuts can also be stored for at least a year by soaking, placing in sealed plastic bags, and refrigerating at approximately 35° F.

Stratification

It is necessary to provide 90 to 120 days at about 37°F to break seed dormancy. Small lots can be pre-chilled in plastic bags in sand or peat in a cooler for the 90 to 120 day period.

SIMPLE TESTS TO ASSURE QUALITY

Inspect all seed to be sure that it meets or exceeds the standards set in the IL-NRCS Woodland Direct Seeding standard (652). Never accept or sell poor quality seed.

You should inspect each species individually for:

- Documentation sheet by lot completed and signed by seller.
- 2) Appearance: clean, insect free, undamaged, proper color, moist or dry, etc. Acorns may often have 1 insect hole and up to 1/4 of the acorn consumed by insects and still be viable.
- 3) Condition: crack or cut at least 10 nuts to determine freshness, color, moisture, viability, and presence of mold or insects. Acorn color should be white or creamy yellow, except for pin, cherrybark, and willow oaks, which will be dark yellow to orange. Record percent failing inspection and the reason. See the references listed for this chapter for more information.

Transportation and Delivery Requirements

This section addresses the issue of transport and delivery of fresh and/or stored seed to the client who is buying it to plant or to resell. Locally collected seed is advantageous because handling and storage can be readily monitored. Always buy high quality. Anyone selling seed must be able to provide:

- Date seed was collected
- 2) Name of the party who collected the seed
- 3) Location of the seed trees (county, state)
- 4) Information on how the seed has been handled since collection (storage conditions and whether seed is stratified).
- 5) Description of general seed condition and appearance
- 6) Cost of seed when delivered or picked up
- Right of return if misrepresented
- 8) A written sheet that provides the above documentation.

If you are selling seed to a dient you will need to sell high quality, viable seed that has been properly cared for during and after collection. Provide complete documentation to all buyers as described in items 1 through 7; this is a statement of quality.

REFERENCES

- **Seed Biology and Technology of Quercus**. 1987. GTR-SO-66. USDA-Forest Service, So. For. Exp. Sta., New Orleans, LA. 21 pp.
- **Seed Collection Manual.** Circa 1980. Illinois Department of Natural Resources, Division of Forest Resources. 23 pp.
- Seeds of Woody Plants in the United States. 1974. Agricultural Handbook No. 450. USDA-Forest Service. 883 pp. Available on the Web at: http://wpsm.net/OR
- **Seeds of Woody Plants in North America.** 1992. Young, JA. and C.G. Young. Dioscorides Press. 407 pp.

NOTE: Copies of all of the above are available for up to a 2-week loan from the NRCS State Agroforester. Some references may also be available from IDNR District Foresters, the IDNR Forest Management Staff Forester, and the State Cooperative Extension Forester.

CHAPTER 7

ILLINOIS STANDARDS AND SPECIFICATIONS FOR DIRECT SEEDING

◆ Introduction	7-2
 NRCS Illinois Woodland Direct Seeding Standard 	7-2
♦ References	7-6



Introduction

NA		

Tree arrangement and spacing should allow for access lanes.

Residual chemical carryover should be considered prior to planting.

Increase the seeding rate as much as possible above the minimum with low cost or locally available woody seeds, which serve as a woody cover crop or nurse crop. Woody plants are usually less competitive than grasses or forbs and are the best companion crops for trees. Potential nurse crop species include the light seeded tree species listed under "Species to Use."

Other potential trees and shrubs to use include redbud,

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, narrative statements in the conservation plan or other acceptable documentation.

Site Preparation

Planting sites will be prepared by destroying competing vegetation by either herbicide, or cultivation or both. If soil erosion potential exists, strips of existing vegetation will remain undisturbed of minimum width and minimum number to reduce soil erosion (see Contour Buffer Strips, 332, for guidance). On clean tilled sites with soil erosion potential that are row planted a cover crop of non-competitive grasses or legumes will be sown, (see Conservation Cover, 327, for recommendations for tree/ shrub plantings or temporary cover). If a cover crop is needed in a row planting, strip cultivation or herbicide spray will be used with a minimum strip width of 4 feet to create a seedbed for direct seeding.

Species to Use

For species selection refer to the appropriate section of the FOTG, Section II, Forestland Interpretations or Windbreak Interpretations or the standard for the specific9c 0.4cTe13.68 rg / F72sr

USD/09 9 ion.i0225 Tw (s0.1647 rg / F7:(specific9c 0.4cTespeci276.election197ob sheets,2 approprHeavy rg are .0672 (specET

NRCS CONSERVATION PRACTICE STANDARD: WOODLAND DIRECT SEEDING

Seeding Rate

Plant at least 3,000 seed per acre of heavy seeded species if row planting; 4,800 if broadcast seeding. If there is no source of light seeded species within 500 feet of any portion of the planting site that portion will receive an additional 1,000 seed per acre of either heavy or light seeded species. To overcome predation double the seeding rate for the first 100 feet beyond a forest edge.

Seeding Methods

Seed may be planted mechanically or by hand, in rows or broadcast. Depth of planting for heavy seeded species will be approximately 2 times the seed diameter, or 2 to 5 inches deep depending upon species. Plant all species at 2 inches or more if seed predation and/ or low soil moisture are anticipated. Light seeded species will be sown on the surface of the soil. Seed that is broadcast will be disked in and cultipacked or rolled. The following chart shows row spacing and seed spacing combinations that will result in 3000 seed per acre:

6' row spacing = 2.4'/ seed 7' row spacing = 2.0'/ seed 8' row spacing = 1.8'/ seed 9' row spacing = 1.6'/ seed 10' row spacing = 1.5'/ seed 11' row spacing = 1.2'/ seed 12' row spacing = 1.2'/ seed 13' row spacing = 1.1'/ seed 14' row spacing = 1.0'/ seed 15' row spacing = 1.0'/ seed 15' row spacing = 0.9'/ seed 17' row spacing = 0.9'/ seed 18' row spacing = 0.8'/ seed

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REFERENCES

- Seeds of Woody Plants in the United States. 1974. Agricultural Handbook No. 450. USDA-Forest Service. 883 pp. Available on the Web at: http://wpsm.net/OR
- **Seeds of Woody Plants in North America.** 1992. Young, JA. and C.G. Young. Dioscorides Press. 407 pp.
- Silvics of North America, Vol. 1, Conifers and Vol. 2, Hardwoods. 1990. Agricultural Handbook 654. USDA Forest Service. Vol. 1, 675 pp. Vol. 2, 877 pp. Available on the Web at: http://www.nafs.fed.us/spfo/pubs/silvics manual/table of contents.htm.
- **Growing Illinois Trees From Seed.** 1983. Circular 1219. C.E.S., College of Agriculture, University of Illinois, Urbana-Champaign. 32 pp.
- **Seed Collection Manual**. Circa 1980. Illinois Department of Natural Resources, Division of Forestry Resources. 23 pp.
- Direct Seeding Hardwoods on the Cache River Joint Venture. 1997.

 Maginel, D. and M.D. Hutchison. The Nature Conservancy, Ullin, IL. 3 pp.
- Oak Regeneration: Serious Problems, Practical Solutions. 1993. GTR-SE-84, USDA-Forest Service, SE For. Exp. Sta., Asheville, NC. 319 pp.
- Guide to Regeneration of Bottomland Hardwoods. 1992. GTR-SE-76. USDA-Forest Service, SE For. Exp. Sta., Asheville, NC. 35 pp.
- **Seed Biology and Technology of Quercus**. 1987. GTR-SO-66. USDA-Forest Service, So. For. Exp. Sta, New Orleans, LA. 21 pp.
- Regeneration of Oaks by Direct Seeding. Johnson, R.L. and R.M. Krinard, USDA-Forest Service, So. For. Exp. Sta., New Orleans, LA. In: Proceedings, Third Symposium of Southeastern Hardwoods. 1985. pp 56-65.

NOTE: Copies of all of the above are available for up to a 2-week loan from the NRCS State Agroforester. Some references may also be available from IDNR District Foresters, the IDNR Forest Management Staff Forester, and the State Cooperative Extension Forester.



CHAPTER PLANTATION ESTABLISHMENT

Introduction

The two most critical issues in establishing tree plantations are controlling competing vegetation (weeds, both broadleaf and grass) and controlling wildlife damage (seed predators such as squirrels and mice and subsequent seedling damage from rabbits, voles and deer).

Weed control for the first 2 or 3 growing seasons is essential to establish any kind of tree plantation, but it may be even more important for direct seeding than for seedling tree planting. Weed competition will greatly reduce seedling growth and eventually reduce seedling survival. Imagine an acorn just beginning to establish a root system and a leafy crown in the midst of a mass of roots and stems of fully developed grass and broadleaf weeds. The limited amount of energy stored in the acorn is quickly exhausted and opportunities to replenish those reserves are severely limited by competition. As a practical matter, chemical herbicides are often the best choice for competition control for direct seeding projects that are more than a few acres in size. Mulches can be used, but their per-acre costs can be quite high. Cultivation has the problems of timing and repetition with increased soil erosion potential and increased root disturbance, therefore making it less practical. The section on controlling competing vegetation will, therefore, focus on chemical methods.

Wildlife damage is probably the most common cause of direct seeding failures. All direct seeding plans should include practices to minimize damaging wildlife by eliminating their habitat for at least the first 2 or 3 years. Practices to eliminate habitat might include cultivating or mowing areas that are not treated by herbicides. It is necessary to either incorporate weed residue into the soil or remove it. Residue left on the planting site becomes rodent nesting habitat. In addition, it is important to determine the present population of potentially damaging wildlife species so that population reduction efforts can be taken if necessary.

CHEMICAL VEGETATION CONTROL*

Would you direct seed your vegetables and not do any weed control? If so stop here, read no further. If you think weed control is important, read more. For success with direct seeding, weed control is essential. Remember, *your objective* is to get trees to replace grass and broadleaf plants and to do this in a bigger, better and faster way. When trees can be made to grow faster during the first three years, the saplings begin to provide their own weed control due to shading.

Both survival and height growth are directly related to vegetation control. We should not accept poor growth after working so hard to collect and sow good seed.

Site Preparation: Before planting seed, do a good job of site preparation. The ideal site is one with a great amount of bare mineral soil. A firm seedbed is essential.

For perennial grasses, mow in mid August and allow 4 to 8 inches of regrowth. Then broadcast glyphosate (Roundup Pro) at the rate of $1\frac{1}{2}$ to 2 quarts per acre. Add 8 ounces (1 pint) of 2, 4-D if legumes are present. After dieback, till the field. This assumes fall seeding.

If seeding will not be done in the fall, delay tillage and leave crop residue. Till in late winter for spring seeding. Plowing followed by disking prepares the seedbed. If erosion is a possibility, leave strips with residue oriented across the slopes at variable spacings depending upon the steepness and length of slopes.

If soybeans are the present crop, you planned well. Simply sow the seed during the fall. With wheat stubble, some burn down or tillage may be needed. For corn stubble, disk or chop the site before seeding, depending on residue density. If tillage has been performed, it may be necessary to roll or cultipack the site to produce a firm seed bed and achieve proper seed planting depth.

*

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.

CHEMICAL VEGETATION CONTROL

There are several effective herbicides available which have been used, especially in Iowa. The following information has been adapted from "Direct Seeding" F-363 11/99 Forestry Extension Notes, Iowa State University, Ames and is authored by Extension Forester Paul Wray and Iowa DNR District Foresters Gary Beyer and Stan Tate. Before you jump into the tables, understand 2 broad kinds of herbicides:

Preemergence

Table 1
Herbicides for First Year Preemergent Weed Control

Surflan (Oryzalin)	Grasses, some broadleaves	2-4 qts./acre
Pendulum (Pendimethalin)	Grasses, some broadleaves	2-4 qts./acre
Pennant (Metolachlor)	Grasses, some yellow nutsedge	1-2 pts./ acre
Goal (Oxyfluorfen)	Grasses and broadleaves	.5-1 lb/ acre
Simazine (Not on ash or maple)	Grasses and broadleaves	1-4 lb/ acre

Table 2 **Postemergent Weed Control**

Envoy (Clethodim)	Græses	17-34 oz/ acre
Fusilade (Fluazifop-p-butyl)	Grasses	24-48 oz/ acre
Transline (Clopyralid)	Broadleaves	.5-1.5 pt./ acre may cause damage*
Classic (Chlorimuron Ethyl)	Broadleaves and nut sedge	.575 oz/ acre may cause damage*
Scepter (I mazaquin)	Broadleaves and grasses	2/3 pt/acre may cause damage*
Oust (Sulfometuron Methyl) Exhibits both preemergent and postemergent activity	Grasses and broadleaves	.5-1 oz/ acre may cause damage*

^{*} Damage will be minor, usually consisting of leaf discoloration and arrested growth. Trees generally recover.

Points to keep in mind

- Know and calibrate all spray equipment and properly apply the lowest effective dose.
- If trees are in rows and a band treatment is applied instead of broadcast, use a minimum 4' band the first growing season. Increase the band width to 5' to 6' for the 2nd year. Tree roots grow in length more than the tree top grows in height during the first few years.
- Take the training for general standards and the pesticide applicator test. Contact any county Cooperative Extension service for the schedule.
- ii Alternative herbicides to check out:
 - Goal 2XL Rohm and Hass labeled for conifers and conifer seedbeds (nurseries)
 - Envoy Valent Corp. a post emergent grass herbicide. Lists Reed Canary grass as susceptible.
 - Scepter ODG Cyanimid (BASF) labelled now for cottonwood & hybrid poplar which are extremely sensitive to most herbicides. Both pre-emergent & postemergent activity.
 - Oust DF Dupont black walnut and white oak are sensitive. Use lowest dose on black walnut, use less than 1 oz rate and avoid high pH sites.
- **Ö** Bottom Line: more reforestation practices have failed in Illinois due to heavy grass competition than for any other reason.

MECHANICAL VEGETATION CONTROL

Cultivation can also be used to effect excellent weed control. Several points are important for tillage:

- "Cultivate on nearly level slopes to avoid excessive erosion.
- Establish rows across slopes to reduce erosion.
- On slopes, leave short, 2' to 4'spots or strips untilled. This breaks the erosive power of runoff.
- "Timing is crucial; cultivate early to destroy seedling weeds.
- " Maintain a depth of not more than 1 inch.
- Three or more passes per growing season will be needed for effective weed control.

WILDLIFE DAMAGE MANAGEMENT



Habitat management is the key to managing wildlife populations. Mice, voles, squirrels and rabbits will be found in higher numbers if they have suitable habitat, especially cover. Burning, plowing, disking and mowing can be used to destroy cover for damaging wildlife species. By removing cover predators such as hawks, owls, foxes and coyotes are more effective, reducing existing populations, and preventing future population increases. Every direct seeding plan should address both weed control and manipulation of cover for damaging wildlife, both on the planting site and on adjacent areas.

A snap trap survey before planting is the best way to p46otes aing bait. ORiasey bsdwork tottploth admoT* sey bslly

Annual Inspection

Regular inspection of direct seeding sites will help build experience with the



DIRECT SEEDING INSPECTION DATA SHEET

Copy this form and keep the original in your binder.

Lando	wner		Farm	No	Tract No
Sec		TWN	RGE		Acres
Specie	es Planted _				
		Prep or Annual Weed Control			
		Soil Series			
	-			_	
KISK U	or whame Da	amage			
Plot No.	Species	Approximate Height and Condition	Plot No.	Species	Approximate Height and Condition

DIRECT SEEDING SUMMARY DATA SHEET

Copy this form and keep the original in your binder.

Plot No. Species	No./ac	Approximate Average Height and Condition	Plot No. Species	No./ac	Approximate Average Height and Condition
Plot No. Species	No./ac	Approximate Average Height and Condition	Plot No. Species	No./ac	Approximate Average Height and Conditio
Plot No. Species	No./ac	Approximate Average Height and Condition	Plot No. Species	No./ac	Approximate Average Height and Conditio
Plot No. Species	No./ac	Approximate Average Height and Condition	Plot No. Species	No./ac	Approximate Average Height and Conditio
Species	Avg No./ac	Average Average Height Condition			
Grand Av	⊥ verage No.	/Acre Average C	condition	<i>A</i>	Average Height





APPENDIX

Summary Table of Seed Data and Average Prices for Bottomland Species	A-2
Summary Table of Seed Data and Average Prices for Upland Species	A-3
◆ List of Seed Brokers (buyers, sellers)	A-4
◆ List of Contract Planters and Consulting Foresters	A-5
◆ List of Equipment Suppliers	A-6
◆ Seed Poundages Required for Direct Seeding	A-7
 "Nuts to Forestry: New Technology for New Forests," by Stan Tate, Iowa DNR 	A-8
◆ Seven Rules for Direct Seeding Success, by Stan Tate, Iowa DNR	

SUMMARY TABLE OF SEED DATA AND AVERAGE PRICES

Bottomland Species

Common Name	Ave Seed/#	Approx Retail Price *	IDNR Purchase Price **
Water Hickory	164	\$3.00	\$0.75/ # , husked
Nuttall Oak	95	\$4.25 to \$5.00	\$1.90/#
Willow Oak	462	\$5.00 to \$8.00	
Sweetgum	82,000	\$55.00	
Baldcypress	5,200	\$7.50 to \$8.00	
Overcup Oak	140	\$3.40 to \$5.50	\$1.90/#
Persimmon	1,200	\$8.00 to \$19.00	
Silver Maple	1,700	\$4.00 to \$5.00	
Shingle Oak	415	\$2.50 to \$9.00	\$0.60/#
Shumard Oak	100	\$3.25 to \$5.50	\$0.90/#
Shellbark Hickory	30	\$1.25 to \$4.00	\$0.75/ # , husked
Swamp Chestnut Oak	85	\$2.50 to \$4.50	\$1.10/#
Cherrybark Oak	580	\$4.25 to \$9.00	\$3.00/#
Sycamore	150,000	\$9.50	
Pecan	100	\$3.00	\$1.25/ # , husked
Hackberry	4,300	\$22.00 to \$35.00	\$5.00/ # , fruit
Green Ash	17,000	\$5.00 to \$10.00	
Black Walnut	40	\$1.50 to \$4.00 husked	\$0.10/ # , unhusked
Bur Oak	75	\$1.20 to \$6.00	\$0.60/#
Swamp White Oak	120	\$1.75 to \$6.00	\$1.10/#
Pin Oak	410	\$2.30 to \$3.85	\$1.90/#

^{* 1998} prices from several commercial seed vendors.

^{**} Prices as of October 2000 are subject to change. Contact a local DNR Forester for the required seed collection permit.

Upland Species

SEED B

CONTRACT PLANTERS AND CONSULTING FORESTERS

Who Advertise Direct Seeding (as of 10/2000)

Roy Bailey

8479 E. 250th Ave. Mason, IL 62443 (618)238-4865

Bundy Tree Farm

Shelby Bundy 1242 Bethel Road Odin, IL 62870 (618)775-8246

Mick Cherry

306 South State Street Genesso, IL 61254 (309)944-4763 (all of Illinois)

Cascade Forestry

RR1 Cascade, IA 52033 (319)852-3042 www.cascade@netinsnet (northern half of Illinois)

Tony Colvin

1340 County Road 900N Lacon, IL 61540 (309)246-3348 Email: 2sis@joysta.com (small acreages only)

Forest Improvement Services

RR 1, Box 393 Janeville, I A 50647 (319)987-2345 (site prep & planting; post planting maintenance; tree planting)

Forest Management Services, Inc.

4120 Haythorne Avenue Terre Haute, IN 47805 (812)466-4445 (7:30-3:00 M, W, TH) www.forest-management.com E-mail: Larry@forest-management.com

Full Circle Forestry

Geode RC& D Bob Petrzelka 3002 A Winegard Drive Burlington, I A 52601-2060 (319)752-6395 (northern half of Illinois)

Michael G. Hamilton

385 Northaven Drive Robins, I A 52328 (319)378-0537 (site prep & planting; seed sales; post planting maintenance; tree planting)

Steve Hamilton

1156 Highway 965 NW Cedar Rapids, I A 52404 (319)857-4935 (site prep & planting; seed sales; post planting maintenance; tree planting)

Jerry Heinz

471 Conty Rd. 800E Tolono, IL 61880 (217)598-2407 cell phone: 369-8181 heinzfarms@prairieinet.net

Manning Tree Farm

Al Manning 1404 Colwell Avenue Charles City, I A 52328 (319)378-0537

Shane Morris

Northeast Iowa T.R.E.E.S RR 3, Box 191 Manchester, IA 52057 (319)927-4108 (site prep & planting; post planting maintenance; tree planting)

Oakwood Timber Improvement Service

Mark Webb 3006 Pleasant View Road Decorah, I A 52101 (319)382-3502

One-Stop Forestry

PO Box 916 Postville, I A 52162-0916 (319)864-3586 or -7112 (NW Illinois)

Prairie Hills Forestry Consulting

321 University Drive Macomb, IL 61455 (309)833-4747 (all of Illinois)

Dan Price

Southeastern Illinois College 3575 College Road Harrisburg, IL 62946 (618)252-6376 Fax (618)252-3156

Paul Roth

9588 Old Route 13 Murphysboro, IL 62966-4411 (616)453-7468 (southern half of Illinois)

Dave Steere

806 Fourth Street SE Waverly, I A 50677 (319)352-3988

Timber Services

Ken Hoene RR 1, Box 247A Shelbyville, IL 62565 (217)774-5611

Woodland Forestry Consulting

10571 - 18th Avenue Monmouth, IA 52309 (319)673-2146 (site prep & planting; seed sales; post planting maintenance; tree planting)

EQUIPMENT SUPPLIERS (Tree Seeders and Planters - May, 2000)

SEED POUNDAGES REQUIRED FOR DIRECT SEEDING

Listed below are the amounts of seed needed to meet NRCS standards for direct seeding when seed is planted in rows (3000 heavy seeded species/ acre) and when seed will be broadcast (4800 heavy seeded species/ acre). Note that walnut, pecan, and all hickory species are husked. *See reference below.

Species	Rangeof Seeds/ lb	Avg #/lb	Small Seed	Avg Seed	Lg Seed	Small Seed	Avg Seed	Lg Seed	
Bitternut Hickory	125-185	156	17	20	24	26	31	39	
Black Oak	125-400	245	8	13	24	12	20	39	
Black Walnut	11-100	40	30	75	272	48	120	436	
BurOak	40-135	75	23	40	75	36	64	120	
Cherrybark Oak	420-745	580	4	5	7	7	9	12	
Chinkapin Oak	263-520	395	6	8	12	10	13	19	
Mockernut Hickory	34-113	90	27	34	88	43	54	142	
Northern Red Oak	75-256	125	12	24	40	19	39	64	
Nuttall Oak	56-143	95	21	32	54	34	51	86	
Overcup Oak	139-154	140	20	22	23	31	35	37	
Pecan	151-174	162	18	19	20	28	30	32	
Persimmon	665-1764	120.770	.6 39 61 (TDc	(31) T68 (TD2-15	0.23783	6 0 TD	-0.639108	0 20 Ti 10

0 TD -0.2803 Tc 0 Tw (263-520) Tj 72 0 TD -0.4075 TTD 0.0725 Tc (0 TD -0.28 0.0725 Tc (4)

40 19

completely dry. Crack open a bunch of the nuts to make sure they are OK. The nut meats should be moist, firm and brightly colored. If you think you have a bad batch, clean off the hulls and caps, and float them. Most of the bad seed will float. Keep and

If you have grass or weeds in or within 50 feet of your planting site, they must be eliminated as completely as possible for at least the first growing season. Plowing, disking or burning will provide some short-term control. These practices need to be followed up with herbicide applications to provide weed control for at least the first 90 days of the growing season. Mowing is not an acceptable grass control practice by itself because it does nothing to eliminate the grass roots, and even very short mowing may not reduce the mouse population to acceptable levels.

The new seedling that grows from the acorn or walnut uses almost all of the food reserves stored within the nut itself within the first 20 to 30 days of growth. At this time the seedling has only a few small leaves to collect sunlight and make food for the plant. Dry soil, shade from weeds, or insect or rodent damage at this stage can cause serious problems. Young seedlings are very vulnerable during the first 60 to 90 days of growth, and therefore, must have almost perfect growing conditions to make maximum growth. It is certainly possible to get seedlings firmly established and 6 to 12 inches tall by the end of the first growing season. Many people have observed that once the direct seeded seedling has completed its first growing season in good shape, it does exceptionally well in the following years. It seems to make up for a slower first year by not suffering the "transplant shock" a nursery seedling goes through.

Use machines for larger plantings. Tree planting machines can be used successfully if you can accurately limit their planting depth, and you have a very low gear on your tractor. You will need to go one m.p.h., and drop one nut every second (difficult to do) in order to have your seeds planted 18 inches apart.

High-density plantings seem to be the most successful. Planting seeds six inches apart in the row seems to help the new seedlings get off to a faster



SEVEN RULES

FOR DIRECT SEEDING SUCCESS

by Iowa DNR District Forester Stan Tate

Plant live seed. I know this sounds dumb, but unless you test your seed before it is planted, you may be making a very dangerous assumption that it is actually viable. Seed absolutely must be tested if you are serious about making direct seeding successful.

Plant at the right depth. Planting too shallow increases losses to rodents and dry soils. Planting too deep increases losses to wet soils and late emergence, which increases winter kill and reduces next year's growth.

Manage rodents and their habitat. Mice, chipmunks, voles, and squirrels will destroy every planting if their numbers are high. Reduce their numbers by burning, mowing, disking, or otherwise minimizing their habitat.

Large open fields with little ground cover offer the best chance of success. Small wooded openings offer the least chance of success.

Planting deeper in hard ground reduces the ability of small rodents to destroy plantings. Supplemental feeding with small grains may also be helpful.

Use lots of seed. Large quantities of seed can help overwhelm rodent seed predators. High density plantings seem to establish themselves much more quickly. Use the cheapest seed as a "woody cover crop."

Control competition. New seedlings from seed are very small and fragile. Their first growing season builds the basis for their future growth. Concentrate your greatest efforts in their first year to assure survival and early growth. A minimum of 2 years of effective weed control will pay dividends.

Match species to the site. Use soils maps and local knowledge to choose species that are well suited to the site.

Use combinations of species. Mixed plantings seem to do the best and provide a hedge against pockets of poor soil and changing weather patterns. We recommend using at least 3 or 4 species in every planting.

Direct Seeding Hardwoods

on the Cache River Joint Venture

by Dave Maginel and Max D. Hutchinson The Nature Conservancy January 1997

The Nature Conservancy began direct seeding hardwoods on the Cache Wetlands Joint Venture

COLLECTION AND

Here are some considerations for the proper handling of acorns:

- Acorns loose their viability if they become dehydrated, therefore, collect them SOON after they drop.
- Store the collected acorns in breathable bags such as onion sacks, burlap bags or standard feed sacks. These bags will reduce heat buildup, allow the seed to breathe and permit excess moisture to drain off.

For The Time

Species:		Seeding Rate:
	Ash (green, white, black combined)	1/2 - 1 bu./acre
	Red Oak	1/2 - 2 bu./acre
	White Oak	1/4 - 1 bu./acre
	Black Walnut	10 - 15 bu./acre
	Bur Oak	1/2 - 1 bu./acre
	Swamp White Oak	1/4 - 1 bu/acre
	Shagbark Hickory	1/4 - 1 bu./acre
	Sugar Maple	1/8 - 1/2 bu./acre
	Black Cherry	1/4 - 1/2 lb./acre

Seeding: The acorns, walnuts and hickory nuts should be seeded first by broadcasting over the entire field. Disk these in to a depth of 1/2 to 2 inches. Then broadcast the ash, cherry and maple seed and lightly disk, culti-pack, or drag to a depth of 1/4 to 1/2 inch. Seeding labor costs will range from \$60/acre up to \$110/acre depending on the size of the project and its proximity to Postville.

Maintenance: At least one other advantage of direct seedings is the shortened period of maintenance required to control competing grasses and broadleaf weeds. Ten thousand seedlings per acre will shade out the competition much sooner than 700, often within a period of three years. We have yet to settle on an exact prescription for chemical weed control, but we feel we're getting close. Currently, our first year weed control recommendation is a fall or early spring application of Goal herbicide at a rate of 2-3 qts/acre. Goal is a pre-emergent product that controls a number of annual grass and broadleaf weeds. Another option is to wait for the weeds to sprout, identify them and treat in early to mid June using Transline at a rate of 1/2 to 3/4 pint per acre to control broadleaves and Envoy at 1 pint/acre for grasses. Best results will be seen when spraying weeds less than 12" tall.

The second years' application will depend on the competition observed after the first growing season. Typically we are applying, in the fall or early spring a solution of 1/2 oz./acre of Oust and 2 qts./acre of Princep. Another alternative may be to repeat the Transline and/or Envoy treatment at the beginning of the second growing season. The need for chemical weed control after the second growing season should become more of a spot spraying concern. By the end of 3 growing seasons many of the seedlings should be 6' or more in height and 1" caliper. At this point the planting Is on its own until the first thinning after year 9 or 10.

Most of the above applications will run from \$40/acre up to as much as \$75/acre depending on herbicides and rates used.

FORESTRY EXTERSION NOTES



For years the standard practice in tree planting has been the use of seedlings, with a planting rate of 500 to 1,000 per acre and 5 to 10 years of follow up weed control until the site is occupied by the trees.

F-363/November 1999

IOWA STATE UNIVERSITY University Extension.

Ames, Iowa

... and justice for all

... and justice for all
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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

<u>Species</u>	Bushels per Acre
Green or white ash, hard maple	1
Oaks, hickory, coffeetree	3-4
Black walnut	10-15

Weed Control

Τ

Most tree plantations including seedling established or those established using seed, suffer from intense competition resulting in poor survival and growth until the trees fully occupy the site. Once the canopies or foliage area of the trees shade the site, weed and grass competition is no longer a growth factor. In fact, at that stage, the plantation begins to function like a forest, not an open or grass field. One potential advantage of using seed is the ability to plant larger number of trees, reducing the time to full occupancy of the site by the trees. Large number of trees may also aid in the development of better tree form. Trees which are crowded during early development form straighter trunks and begin self pruning at an earlier age; however, these plantations may require earlier thinning than wider spaced plantings. The practice of planting large number of seeds has had limited although expanding use in lowa.

As with more traditional plantings, weed control is still essential for good survival and growth. Work with your district forester or consultant for the best method. The first growing season is critical as the seed germinates, begins to grow and must compete with weeds on lowa's fertile soi3sCr sis .093 0.TMost ofchemticaks andtechniquees which ma.

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CONSERVATION RESERVE ENHANCEMENT PROGRAM

Riparian Forest Buffers CP22 Plan

Prepared for:



PROJECT DATA

IFDA/CREP DIRECT SEEDING PLAN

LANDOWNER GOALS

To establish a stand of forest trees in order to satisfy the program requirements of the Conservation Reserve Enhancement Program's CP22 practice, create/improve habitat for wildlife, generate raw material for wood production, provide recreational opportunities, and provide aesthetic beauty. Multiple benefits of your Riparian Forest Buffer practice may easily be derived with proper planning, patience, and effort.

BENEFITS OF DIRECT SEEDING AND EXISTING FORESTS

Trees beautify the landscape, enhance water quality by filtering sediment and absorbing excess nutrients and pollutants, protect and improve streams, regulate stream water temperatures for aquatic benefit, replenish water tables, conserve and stabilize soil, provide the raw materials for our homes, serve as preserves of biological diversity, shape the recreational landscape, mitigate flood damage, create riparian habitat and corridors for wildlife, prevent erosion of streambanks, increase global oxygen levels, reduce so-called greenhouse gases, sequester carbon, clean pollutants from the air, provide shade and buffers against high winds, and wate6 8 Tw latyoight tralleaovid be255tables,n, clrece sr stacernd imlxygenstatsiln

DIRECT SEEDING SITE RECOMMENDATIONS

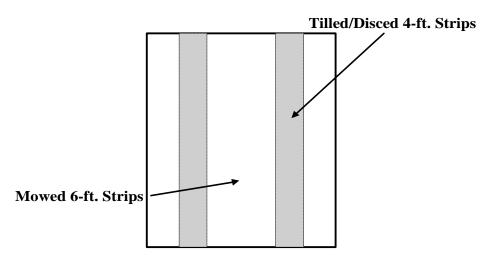
All direct seedings must meet the standards as set forth in **Appendix 2** - *Section 1536.30*. Approval and allocation of cost share monies will be contingent upon meeting these standards.

SITE PREPARATION

(In Central Illinois, the number one cause of plantation failure or stunted growth is the planting of seedlings into sod-forming grasses (brome, fescue, orchard grass, etc.). Therefore, it is in the best interest of the landowner and the trees to prepare the site for the establishment of a suitable and "tree-friendly" cover crop)

Direct Seeding - Site preparation will vary with the method of direct seeding that is used. If you are using a commercial direct-seeder, the rows should be worked as if you were planting a crop. If you are row seeding, mow the site to eliminate rodent/rabbit habitat and to facilitate the seeding process. Till/disc (tilling is more effective) 4-ft strips across the planting site while alternating with 6-ft non-disced/tilled strips. Areas to be broadcast seeded need to be <u>completely</u> worked prior to broadcasting the seed. If the area is in heavy grass/sod, you should burn and then plow/chisel and disc the field. If the sod comes up in large clumps, then you must disc the field again to reduce the soil clod size. If the site is currently in soybeans, simply broadcast the seed following the bean harvest and disc-in the tree seed. If the field is in corn, disc the stubble once after the harvest, then broadcast the seed and disc-in. The final step using the broadcast method is to culti-pack the site to ensure firm soil-to-seed contact and to eliminate air pockets.

If the seeding site has been grazed by cattle, sheep, etc., then the areas to be seeded **must** be ripped/chisel-plowed to ameliorate the compacted soil – if this step is not completed, the survival and probability of a successful seeding may be virtually eliminated. Grassy fields may need to be mowed or broadcast sprayed with herbicide (see *Herbicide Appendix*) to kill existing grass cover. To control perennial grasses such as brome, fescue, and orchard grass prior to seeding, mow in mid-August and broadcast 1 ½ - 2 qt. *RoundUp Pro* plus surfactant when regrowth is 6-inches tall. Add ½ pint of 2,4-D if legumes are present. The second best way to kill these perennials is in the Spring to mow or burn if there is much litter, wait for 6-inches of regrowth, then broadcast 1 quart *RoundUp Pro* and ¾ oz. *Oust* and wait as long as possible before direct seeding (residual *Oust* may negatively affect seed germination). After the grass has browned, plow and disc the areas in order to prepare a good seed bed. Plowing and then discing is the most effective means of site prep tillage. The field should look ready to plant corn. If erosion is a severe problem, then leave strips oriented across the slopes at variable spacing depending upon the steepness and length of the slopes.



TEMPORARY COVER CROPS

Row Seeding - If a commercial row-seeder is used, it is important that the site is disced heavily and a cover crop planted. Winter wheat at 15-35 lbs./ac, annual cereal rye at 15-35 lbs./ac, or oats at a rate of 15 lbs./acre should be applied prior to direct seeding. Oats is recommended over rye and wheat due to the fact that it is not as prolific in its re-seeding. The wheat, rye, and oats at this rate will not compete with the seedlings and will actually serve to protect (nurse) the young seedlings from the sun and wind during the hot summer

DIRECT SEEDING

Direct Seeding

Field 1 – assuming broadcast seeding rates (5,000-hardmast seeds/ac).

If you seed the practice yourself, please keep track of your hours as well as expenses (tractor gas, rental equipment, etc.) for <u>potential</u> cost share reimbursement. If you hire a contractor, <u>do not</u> pay the contractor until the District Forester has approved the direct seeding project.

VEGETATION CONTROL

Weed and grass control around each tree is required of your practice in order to receive *establishment* costshare benefits. Herbicide applications are recommended as an effective and economical way to control both grasses and broadleaf weeds, to maintain rows (if row seeding) and to facilitate growth and survival of the new trees.

Table 1. Herbicides for First Year Pre-emergent Weed Control

Chemical	Controls	Rate/Acre
Pendulum	Grasses and Some Broadleaves	2-4 qts. or 3.3 lbs.
Surflan	Grasses and Some Broadleaves	2-4 qt.
Goal	Grasses and Broadleaves	$\frac{1}{2}$ - 1 lb.
Pennant	Grasses and some yellow nutsedge	16 - 32 oz.

Table 2. Herbicides for Post Emergent

^{*}All species substitutions must be approved by the District Forester.

^{**} Total seed per acre represents hardmast seed only.

Either apply a 48-inch band (if row seeding) or broadcast spray the entire site (if broadcast seeding) in the fall after the seed is incorporated into the soil using 2 –4 qt. or 3.3 lbs./acre of *Pendulum* (or a selected herbicide in table 1). If a fall herbicide was not applied, use the above *Pendulum* (or a selected herbicide in table 1) treatment in the spring. By mid-June, an application of *Transline* (or a selected herbicide in table 2) at a rate of 8 – 12 oz./acre to control broadleaves and/or *Envoy* (or selected herbicide in table 2) at 17 – 34 oz./acre to control grasses may be needed. The second year's herbicide application will depend on the competition observed after the first growing season. The need for chemical weed control after the second growing season should become more of a spot spraying job (assuming broadcast seeding was used at higher rates).

Read and follow all herbicide label directions carefully. **Two additional years** of vegetation control (post tree establishment) are required to control competing vegetation and to facilitate any mowing that **may** be needed. Cost-share assistance for two sprayings within the first 24 months of your practice establishment is available through your county FSA office. Additional assistance for spraying may be available to you from IFDA, but only if funding exists. However, you are obligated to spray even if cost-share funding is not available. Cost-share assistance will not be approved if the vegetation control is not applied.

Mowing

Mowing does not control the roots of competing vegetation. However, it is an important aspect in controlling the height of competing vegetation, identifying tree rows, and <u>reducing rodent habitat</u> in the fall and winter. There is some indication (although not conclusive) that mowing may increase deer browsing on dormant seedlings in the winter. Therefore, my recommendations are:

- 1. Do not mow if you have a **well established**, recommended conservation cover crop (e.g., rye, oats, timothy and/or redtop) that is keeping out undesirable vegetation.
- 2. Mow once prior to May 1st to avoid affecting ground-nesting birds and to identify rows.
- 3. Mow only half of your plantation after September 30th
- 4. This is a test to see how prevalent deer browsing is around and in your tree plantation.
- 5. ***If deer browsing becomes a problem in your tree plantation...then discontinue mowing***
- 6. ***If deer are not a problem...then continue to mow***
- 7. If rodent (rabbits, mice, voles, etc.) damage is high...then continue to mow (nuisance permits for rabbits *may* be available from IDNR Wildlife Biologists).

Mowing is not eligible for cost-share reimbursement in CRP/CREP practices or with IFDA. A \$5/ acre maintenance supplement is included with your annual payment from the Farm Service Agency (FSA) and should be used to offset the cost of mowing.

RESOURCE PROTECTION

Protecting your direct seeding project to ensure survival and growth is required at all times. Livestock grazing and fire *must* be excluded from your seeding area. Inspect your trees periodically during the growing season. Remedial steps may need to be taken when/if appropriate. Browsing damage from wildlife and damage from pest and pathogens may occur in your seeding site and should immediately be brought to the attention of the District Forester. If threatened or endangered species are discovered, this plan should be reviewed and modified, if needed, to protect those species.

MAINTENANCE SCHEDULE

(fall seeding)

The following schedule has been developed in order to give you direction and to help you prioritize the recommended practices in your plan. Deviation from this schedule must be cleared with the District Forester. Consulting foresters and contractors are available to perform many of the practices recommended in your plan. Regardless of how the work is carried out, you are responsible for seeing that these practices are carried out according to the specifications set forth in your management plan.

YEAR	PRACTICE	STAND	ACRES
Fall 2000*/Spring 2001	Establish Conservation Cover Crop (only if row seeding)	1	All
Fall 2001	Commence Direct Seeding Project (seeding site/rows must have received site prep) Apply Herbicide** from Table 1	1	All
Spring 2002	Apply Herbicide from Table 1 (if not applied the previous fall)	1	All
Early June 2002	Mow*** Non-Seeded Strips (if row seeding		
Mid-June 2002	Apply Herbicide from Table 2 (use as rescue treatment only if necessary	1	All

PERFORMANCE CRITERIA

Natural factors beyond our control, i.e., late-spring flooding that extends into summer, a droughty spring after planting, and deer and small mammal depredation – can cause failure. Therefore, this practice will be completed when at least 300 - 450 seedlings/acre of the desired species are in a "free to grow" condition, that is equal to or greater than the height of all competing vegetation, out of reach of deer browse (usually 5 feet), and with a ground level caliper of at least 1 inch, deterring rabbit girdling. Sample plots should be mil-acre (1/1000 of an acre) size for broadcast areas. This is a circular plot with a radius of 3 feet 8.7 inches, which can be measured using string from a center point or making a permanent plot. Twenty-five is the minimum number of plots for any seeded area. To get the number of seedlings per acre on the area, a two-step process in involved: (1) Get an average number of seedlings per plot by dividing the total number of counted seedling by the total number of plots (2) Multiply the average number of seedling per plot by 1,000...this then will provide you with the average number of seedlings per acre.

COST-SHARE ASSISTANCE

(be sure to read and understand)

Various State and Federal cost-share (C/S) programs are available to help you implement your practices as PERFOR66ders0T

PROGRAM RESTRICTIONS

- **Ø** If after (3) growing seasons you have failed to plant seedlings, direct seed, or naturally regenerate your CRP practice with a minimum stocking of 300 trees/acre, you may be removed from both the Federal and State program for noncompliance.
- Onverting CRP tree plantings to other types of land use will result in repayment of state cost-share payments associated with the planting. This penalty applies to practices not maintained for a minimum of 10 years from the date the practice was established and approved. This does not necessarily coincide with the management plan approval date or any concurrent federal programs on this acreage.
- **Ø** Repayment of all cost-share monies earned if the management plan is not followed. This penalty also applies in the event of land ownership changes and the new owner does not assume all obligations under this management plan.
- **Ø** Any planting stock obtained from the state nurseries cannot be removed from the property with the roots attached. This restriction is binding to all subsequent landowners.
- **Ø** Modifications to this plan must be approved by the landowner and the District Forester. Any changes must be submitted in writing and documented by amending the original certification indicating the change with the appropriate dates and initials. The original plan approval date does not change.
- **Ø** Must return annual review letter to retain your participation in IFDA program.
- **Ø** It is unlawful to use state produced plants and plant materials for ornamental plantings, shade trees, landscaping, banquet or party favors or commercial promotion (17 IL Adm. Code; Chapter 1; Section 1540.30; Paragraph d).
- **Ø** **For direct seeding, the cost-share practice may be attempted a second time if, by no fault of the land-owner, fewer than 300 seedlings of acceptable size per acre survive after one full growing season.
- **For direct seeding projects, if after two full growing seasons there are fewer than 300 seedlings of acceptable size per acre no further attempts will be made to direct seed and seedlings will have to planted.

CONCLUSION

Signing the management plan certification initiates a partnership between you and the Illinois Department of Natural Resources (IDNR). By accomplishing the objectives in your plan, you will have demonstrated your commitment to the principles of land stewardship. It is important for you to read and understand your plan and the information in the appendices. Do not sign the certification page of this plan until all questions and concerns have been resolved to your complete satisfaction. Any future decisions regarding your forest resources should be carried out in consultation with a professional forester.

This plan prepared by

IDNR SEED PRICE LIST *

* October 2000 prices are subject to change. Contact a local DNR District Forester to obtain the required seed collection permit.

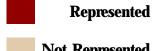
Species	Price per Pound
Hickory (Carya sp.)	0.75 husked
Hackberry (Celtis occidentalis)	5.00 fruit
Black Walnut (Juglans nigra)	0.10
White Oak (Quercus alba)	0.90
Bur Oak (Quercus macrocarpa)	0.60
Red Oak (Quercus rubra)	0.90
Pecan (Carya illinoensis)	1.25 husked
Black Oak (Quercus velutina)	1.10
Chinkapin Oak (Quercus muehlenbergii)	1.90
Shumard Oak (Quercus shumardii)	0.90
Swamp White Oak (Quercus bicolor)	1.10
Cherrybark Oak (Quercus pagoda)	3.00
Shingle Oak (Quercus imbricaria)	0.60
Hazelnut (Corylus americana)	5.00 husked
Pin Oak (Quercus palustris)	1.90
Swamp Chestnut Oak (Quercus michauxii)	1.10
Nuttall Oak (Quercus nuttallii)	1.90
Overcup Oak (Quercus lyrata)	1.90
Post Oak (Quercus stellata)	1.90



Neighboring States

Illinois

Description: White ash is a tall, stately tree often reaching a height of 100 feet. It grows best on upland sites with deep, moist soils. White ash often grows in woods with northern red oak, chinkapin oak, white oak, black oak, sugar maple, basswood and other species.



Not Represented

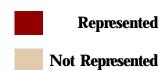
General Comments

White ash is planted extensively as a park

Description: Bitternut hickory is a mediumsized tree with an irregularly rounded crown

Neighboring States

Illinois



Carya tomentosa Mockernut Hickory

Distribution & Adaptability

Neighboring States

Illinois

Description: Mockernut hickory is also known as white hickory. This medium to tall tree grows to heights of up to 90 feet mainly in upland woods.



General Comments

Wood from mockernut hickory is very strong and is often used for hammer and axe handles as well as sporting equipment.

Special Notes

Large seed crops can be expected every 3 to 4 years. On average, 100 pounds of fruit yield 50 to 80 pounds of cleaned seed. There are approximately 90 cleaned seeds per pound.

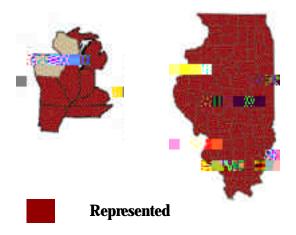
Seedsmaybes

Carya glabra Pignut Hickory

Distribution & Adaptability

Neighboring States

Illinois



Description: Pignut hickory is a mediumsized tree, up to 75 feet tall. The crown is often oblong or egg shaped with the widest part at the top. **Pignut hickory grows best on dry upland soils.**



Not Represented

The heavy group of district of tool had designed at hier equipment as to district as fuel. Early pion are used pignut hickory to construct the search and spokes of wagon when

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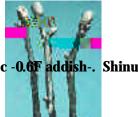
Special Notes

Large seed crops can be expected every 2 to 3 years. On average, 100 pounds of fruit yield 65 to 85 pounds of cleaned seed. There are approximately 200 cleaned seeds per pound.

Seeds may be stored in closed containers at 40° F and 90% relative humidity for 3 to 5 years.

Twigs: Stout, smooth. Shiny brown or gray.

Rounded buds with a short point at the ti.p0.045nded budaTf 0.012 T 1.1Tf 0.05170Tc -0.6F addish-. Shinutro



Bark: Light gray to black. Smooth on younger trees, later separating into furrowed ridges.



Carya ovata Shagbandopticak 6585F2

Distribution & Adaptability

Neighboring States

Illinois

Description: Shagbark hickory is a medium to large tree, up to 80 feet tall. The rounded crown turns a rusty, golden brown in the fall. Shagbark hickory typically grows best on well drained bottomland soils, but more commonly occurs throughout upland woods.





Represented



Not Represented

General Comments

Shagbark hickory can sprout easily and quickly overtake open fields. The heavy, strong and flexible wood is used for tool handles and athletic equipment. Also used as fuel for barbecue grills.

Special Notes

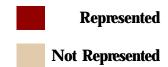
Large seed crops can be expected every 2 to 3 years. On average, 100 pounds of fruit yield 25 to 38 pounds of cleaned seed. There are approximately 100 cleaned seeds per pound.

Seeds may be stored in closed containers at 40° F and 90% relative humidity for 3 to 5 years.

Neighboring States

Illinois

Description: Shellbark hickory is also known askingnut hickory. The largest of the hickories, shellbark also has the largest leaves and fruit. This tree can grow to heights of over 100 feet and most often grows in better drained parts of bottomlands.



General Comments

Like other hickories, this wood is heavy and

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Quercus velutina Black Oak

Distribution & Adaptability

Neighboring States

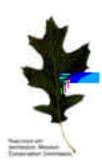
Illinois

Description: Black oak is a medium to large tree with a straight trunk and a broad, rounded or oval crown. It mainly grows in well drained upland soils.

Leaves: Alternate, borne simply with 7 to 9



deep to shallow lobes in leaves 10 inches long and 8 inches wide. Tips of lobes separate into smaller lobes with bristled tips. Widest above the middle. Leaves are dark green and shiny above. Pale green and smooth or often hairy along veins below. Leafstalk up to 5 inches long, stout; smooth to finely hairy.



Not Represented

Represented

Fruit: Appear singly or in pairs. Reddishbrown acorn; oval and pointed at the tip. Up to ¾ inch long. Scaly cap with ragged edges; covers approximately ½ of the nut.



General Comments

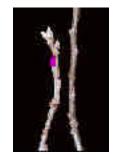
Black oak is used for general construction and fuel.

Special Notes

Expect seed crops every 3 to 4 years. On average, 100 pounds of fruit yield 40 pounds of cleaned seed. There are approximately 245 cleaned seeds per pound.

Remove defective acorns from viable acorns by floating off the bad nuts. It is not advisable to store the acorns for more than one winter.

Twigs: Sender to stout. Reddish-brown to dark brown. Long buds, up to ½ inch; angular and hairy; usually gray to gray-brown.



Bark: Black, rough, and deeply furrowed. The bright orange to yellow inner bark distinguishes the black oak from red oak and Shumard oak.



Quercus macrocarpa Bur Oak

Distribution & Adaptability

Neighboring States

Illinois

Description: One of the largest, most long-lived trees in the central United States, the bur oak has the largest leaves and acoms of all native oaks. Macrocarpa is Greek for "big-fruited." The bur oak can grow up to 120 feet tall and has a rounded crown, straight trunk, and a slightly buttressed base. This tree grows on dry upland sites, but prefers rich, moist lowland soils.

Leaves: Alternate, simply borne with 5 to 7 coarsely rounded lobes. Lobes below the middle cut nearly to the midvein. Up to 14 inches long and 7 inches wide. Broadest at the top. Dark green and smooth or lightly hairy above. Paler and slightly downy below. Short, stout leafstalks, up to 1 inch long; smooth to finely hairy.

Represented

Not Represented

Fruit: Up to 1¾ inch in diameter. Scaly cap; long, hairy fringe; covers over ½, sometimes nearly all, of the acom. (Much

Quercus pagoda Cherrybark Oak

Distribution & Adaptability

Neighboring States

Illinois







Represented



Not Represented

General Comments

Cherrybark oak produces high quality lumber and is often used for cabinet making, interior finishing and furniture. Though not widely planted, cherrybark oak makes a fine shade and windbreak tree.

Special Notes

Cherrybark oak acorns are small (580 per pound) and are eaten by a wide variety of wild-life species. Few mature trees can be found in areas where collecting is easy or efficient, such as parks, cemeteries, etc. For the above reasons, cherrybark oak acorns are among the highest priced and most difficult to obtain. Good acorn crops tend to be frequent, at 1 to 2 year intervals.

Description: Cherrybark oak is named for the bark's similarity to that of black cherry. This fast growing tree may reach heights in excess of 100 feet. The crown is broadly rounded and the trunk is straight. Most often grows in bottomlands and riverbanks on deep, well

drained soils.



Leaves: Alternate, borne simply with 5 to 11 pointed lobes at nearly right angles to the midrib. Lobes cut almost ½ way to the midrib. Widest above the middle. Up to 10 inches long and 7 inches wide. Dark green, smooth and shiny upper surface. Pale, hairy lower surface. Stout, hairy leafstalks; 1 to 2 inches long.



Fruit: Appear singly or in pairs. Brown. Oval. Up to ½ inch long. Finely hairy cap; covers less than 1/3 of the length of the acom. Bright orange nut when cut.



Twigs: Stout. Gray to reddish-brown. Oval buds; up to ¼ inch in length; angular, hairy; chestnut brown.



Bark: Dark gray. Small scales with narrow ridges.

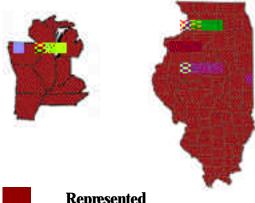


Quercus muehlenbergii Chinkapin Oak

Distribution & Adaptability

Neighboring States

Illinois



Description: Chinkapin oak is a long lived, medium-sized tree capable of reaching 300+ years of age and 60 to 80 feet in height at maturity. Growth rate is moderate and compares to white oak. Limestone-derived soils and upland sites are preferred, but may be found on well-drained, floodplain terraces with soil pH near or above 7.0.



Leaves: Saw toothed margins, widening toward a pointed tip. Smooth, yellow-green above, white below. Leaf size variable, but up to 8 inches long and 5 inches wide with a stalk up to 1.5 inches long.



Represented



General Comments

A widely distributed but uncommon forest tree. Wood quality is similar to white oak. Tolerates a wide variety of sites, including thin, poor soils. Makes a good street or yard tree, particularly on neutral to basic soils commonly found near concrete.

Fruit: Small, shiny, up to ¾ inch, ovalshaped, dark brown or black acom borne on a short stalk. Cup encloses about 1/3 of the acorn, with a fine fringe.



Special Notes

Good seed crops are relatively frequent, every 2 to 4 years, and can be very heavy, up to 400+ pounds from a mature tree. Approximately 400 acorns per pound of seed. Chinkapin oak acorns are sweet and readily eaten by a wide variety of wildlife. Acorns have no dormancy and are similar to white oak in their tendency to sprout æ soon as they are soaked or come in contact with moist soil. Seed should be planted as soon as possible or stored for short periods only at 40°F or less.

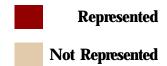
Twigs: Sender, smooth, orange-brown to gray or even purplish, with 1/8 inch reddishbrown or gray buds.



Bark: Ashy gray, mottled white, shallowly furrowed, rough and flaky.

Description: Pin oak is a medium-sized tree,

Neighboring States Illinois



Neighboring States Illinois

Neighboring States

Neighboring States Illinois



Quercus michauxii Swamp Chestnut Oak

Distribution & Adaptability

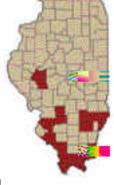
Neighboring States

Illinois

Description: Also known as basket oak, swamp chestnut oak is a medium to large tree, up to 100 feet tall, with a rounded crown. This tree generally occurs in the moist soils of lowland woods.













General Comments

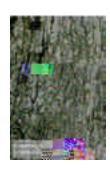
This high quality, hard, heavy wood is used for general construction, furniture and cabinetry. This is also an excellent landscape tree. Acorns are sweet and highly favored by many wildlife species.

Special Notes

Expect seed crops every 3 to 5 years. On average, there are 40 to 50 pounds of cleaned seeds per 100 pounds of fruit and an average of 85 cleaned seeds per pound.

In general, swamp chestnut oak acorns should not be stored, because acorns in the white oak group begin to germinate soon after falling.

Bark:



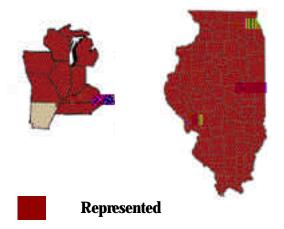
Quercus bicolor Swamp White Oak

Distribution & Adaptability

Neighboring States

Illinois

Description: Swamp white oak is a medium to large tree, growing up to 70 to 90 feet tall, with abroad, rounded crown. This tree occurs mainly in the moist soils of bottomland woods.





Not Represented

General Comments

The hard, heavy, strong wood is used for interior finishing, cabinets, fuel, and fenceposts.

Special Notes

Expect seed crops every 3 to 5 years. On average, there are 60 to 75 pounds of cleaned seeds per 100 pounds of fruit and an average of 120 cleaned seeds per pound. The acorns are favored by wildlife.

In general, swamp white oak acorns should not be stored, because acorns in the white oak group begin to germinate soon after falling.

Fruit: Appear singly or in pairs on staks it choose process. Let be own. Ova a proximality induction long both brown captures, nairy 8,5200 pp. 36.2 Tf 0009 Tc0



Twigs: Stout. Grayish-brown to yellowish-brown. Bark on twigs peels back in papery sheets. Yellow-brown buds, dustered at tips of twigs; oblong to round; up to ½8 inch long; smooth to lightly hairy at the tip.

Bark: Grayish-brown. Deeply furrowed. Loose, shappy plates on old trees.



Neighboring States

Illinois

Description: White oak is a long-lived and large tree, up to 100 feet tall, with a very broad crown and relatively short trunk when open grown. This tree grows in dry or moist soils, but prefers loamy, well-drained upland soils.

Leaves:



Represented



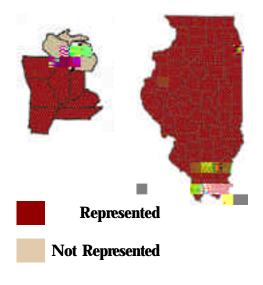
Not Represented

Carya illinoensis **Pecan**

Distribution & Adaptability

Neighboring States

Illinois



Description: Pecan is a large tree, up to more than 120 feet tall with a widely spreading crown and a relatively short, stout and straight trunk. Pecan grows best in moist woods and along rivers.

Leaves: Alternate, compound with 9 to 19 spear shaped leaflets which curve to a long, pointed tip.





General Comments

The light reddish-brown wood is hard and heavy and is used for interior finishing, furniture, and tool handles. Often cultivated for the sweet nuts. Pecan is a good choice for agroforestry projects because of the combination of valuable nuts and timber.

Special Notes

Large seed crops can be expected every 2 to 3 years. On average, 100 pounds of fruit yield 50 to 75 pounds of seed. There are approximately 100 cleaned seeds per pound.

If stored for an extended period, seeds should be kept in closed containers at 40° F and 90% relative humidity. Twigs: Stout, brown twigs. Harry when young, later becoming smooth. Buds have long points; up to ½ inch long with yellow glandular dots; lightly hairy.



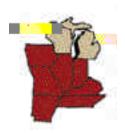


Diospyros virginiana **Persimmon**

Distribution & Adaptability

Neighboring States

Illinois







Represented



Not Represented

General Comments

The heavy, hard wood of the persimmon tree is resistant to splitting. The heartwood is nearly black and is used for flooring, golf club heads and billiard cues. Persimmons are a source of food for a variety of wildlife and are sold commercially as well. It is a good choice for agroforestry projects since both the fruit and the wood have value.

Special Notes

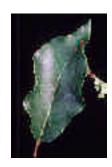
Large seed crops can be expected every 2 years. On average, 100 pounds of fruit yield 10 to 30 pounds of cleaned seed. There are approximately 1,200 cleaned seeds per pound.

Run the fruit through a macerator with water and float off pulp. There is a market for canned pulp. It is also possible to rub and wash the fruit through 1/4 inch mesh hardware doth. Dry seeds for 1 to 2 days. Store thoroughly dried seeds in dry, sealed containers at 40° F.

Description: The persimmon is a mediumsized tree, up to 75 feet tall with a broad, rounded or flattened crown. This tree grows best in rich bottomland woods, but occurs widely in upland woods as well.



Leaves: Alternate, simple. Oval to elliptical with a pointed tip. Smooth edges. Tapered or rounded base. Up to 5 inches long and 2½ inches wide. Dark green, smooth, shiny upper surface. Paler, smooth lower surface. Stout leaf stalks, smooth or lightly hairy; up to 1 inch long. The persimmon leaf is often confused with sour gum, but persimmon leaves are more abruptly pointed at the tips.



Fruit: Fleshy, round berry. Up to 2 inches in diameter. Yellow-orange to orange as it ripens. Wrinked and sweet when fully ripe. Contains 1 to 8 flattened seeds.



Twigs: Sender, brown. Smooth or hairy. Rounded buds; smooth; dark reddish-brown; up to 1/8 inch long; covered by two dark scales.



Bark: Dark gray to black. Separates into thick, blocks at maturity. Resembles alligator skin.



Platanus occidentalis American Sycamore

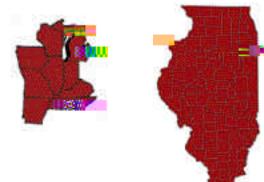
Distribution & Adaptability

Neighboring States

Illinois

Description: Sycamore is a large tree, which can grow over 100 feet tall with a broad, irregular crown. It grows best in bottomland woods.





Leaves: Alternate, simple with 3 to 5 shallow, coarsely toothed lobes. Heart shaped or straight base.



Represented



Not Represented

Fruit: Round. Light brown. Approximately 1 inch in diameter. Long stalks. Many small seeds surrounded by hairs.



General Comments

The heavy, strong wood is occasionally used for interior finishing, furniture, and pulpwood. The American sycamore grows quickly.



On average, 100 pounds of fruit yield 56 to 66 pounds of cleaned seed. There are approximately 150,000 deaned seeds per pound. Collect after leaf fall and into the next spring. Dry on ventilated trays. Wear a dust mask when separating seeds. Crush to remove dust and fine hairs, then rub through hardware cloth using a fan to blow away debris. Macerators or hammer mills are also used to separate the seeds. Store short-term in a cool, well-ventilated place. For extended storage, dry to 10 to 15 % moisture content and store in airtight containers at 20° to 38° F.



Bark: Reddish brown on young trees. Later breaking away into thin, rounded, flat scales giving a brown and gray and white mottled appearance.



Liriodendron tulipifera **Tuliptree**

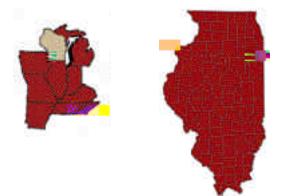
Distribution & Adaptability

Neighboring States

Illinois

Description: Also known as yellow poplar, the tuliptree can grow up to 200 feet tall with an oblong or pyramid shaped crown. This tree thrives in rich upland soils.





Leaves: Alternate, simple. Large, with 4 wide lobes. Upper two lobes are broadly separated, giving the leaf a "saddle" shape. Smooth edges, indented base. Approximately 4 to 6 inches long and wide. Bright green upper surface. Paler lower surface. Long, slender leafstalks.



Not Represented

Fruit: Seed cones. Approximately 2½ inches long. Overlapping seeds; winged and angled.



General Comments

Represented

The soft, durable wood is very workable and is used for furniture, frames and canoes. The tuliptree can grow rapidly in rich soils. It makes an attractive shade tree.

Twigs: Smooth, reddish-brown. Leaf scars nearly spherical. Flattened buds with 2 large scales; shaped like duckbills; up to 1 inch long.



Special Notes

There is much variation in seed yields. Seed viability is characteristically low, averaging 10 to 35 percent. The quantity of seeds per bushel of cones ranges from 5 to 13 pounds. The average number of cleaned seeds per pound is about 10,000.

Shake or pick seed cones from trees in dry weather. Dry immediately. Drying may take 7 to 20 days. Separate seeds by flailing, hand-shucking, treading, or using a hammermill or macerator. Dried seeds may be stored in sealed containers at 36° to 40° F for several years.

Bark: Smooth and grayish on young trees. Later becoming dark gray with some white showing between furrows.



Neighboring States Illinois



Bark: Dark brown to black with deep fur-