MISSISSIPPI

FORESTRY COMMISSION

**SEEDLINGS ARE PERISHABLE!**

Provide proper care and handling at all times.
Plant seedlings as soon as possible!

*November 1999*

# Seedling Care and Planting Handbook

## Procedures for Pine and Hardwood

**Mississippi Forestry Commission**

# Seedling Care and Planting Handbook

This handbook contains the Mississippi Forestry Commission's procedures for the proper care and planting of pine and hardwood seedlings.

**Mississippi Forestry Commission**

---

*The Mississippi Forestry Commission provides equal employment opportunity and services to all individuals regardless of race, age, disability, religion, color, gender, creed, national origin or political affiliation.*

## Contents

# Introduction

Tree seedlings are living, breathing organisms that require careful handling at all stages of the reforestation process. From the time of lifting at the nursery until seedlings are transplanted in the field, there is danger of weakening or killing the seedlings due to improper handling techniques. This problem is further complicated by the varying environmental conditions that occur during the planting season.

Everyone involved in the reforestation process must accept responsibility for proper seedling care, handling and planting. Environmental conditions should be monitored continuously and field operations adjusted as necessary to adhere to the standards presented in this handbook.

Successful tree planting does not happen by chance—it requires thought, planning and attention to detail. Success does occur more frequently than failure. But failure and less-than-desired results happens to many tree planting operations every year, resulting in loss of time, effort and money. For the affected landowner it is a serious matter, especially when failure could have been avoided. From the first seed sown at the nursery to the last seedling planted in the field, everyone involved must accept responsibility for tree planting success or failure.

There are environmental factors beyond anyone's control that can contribute to a tree planting failure. Dry weather and severe freezes are two factors most commonly associated with a planting failure. However, there are a far greater number of factors totally within human control that contribute to tree planting failures. Timing of planting, storage, handling, seedling quality, and tree planting techniques are the most commonly overlooked aspects that can make or break the success of a tree planting operation.



# Seedling Evaluation

Seedling quality will be monitored continuously to ensure only good quality seedlings are planted. Seedlings will be inspected at time of pick up and during planting to determine their overall condition. The following indicators of dead or dying seedlings will be considered during seedling evaluation:

- ❒ Sour or fermented smell
- ❒ Seedlings warm or hot to touch
- ❒ Bark, especially on roots, slips off easily
- ❒ Cambium layer has turned brown, or fading to brown
- ❒ Mold developing
- ❒ Yellow needles

If the County Forester suspects dead or dying seedlings, the District Forester or Area Forester in charge of seedling operations will be notified immediately. The seedlings will be inspected by the district within 24 hours. Dead or dying seedlings will be moved to the district cooler, and the Forest Management Division at the State Office notified immediately.

# Seedling Transportation

A **Seedling Receipt** (see **Appendix A**, page 15) will be completed each time seedlings are transferred. This will serve as documentation of delivery and acceptance of each shipment of seedlings.

### Refrigerated Vehicles

1. Seedlings will be transported in refrigerated vehicles at temperatures between 33°F and 38°F inside the cooler.
2. Bags/bundles of seedlings will not be stacked more than two layers deep without the use of spacers (pallets or slats) or three layers deep for

boxes. Allow 2" to 4" of air space between layers of seedlings.
3. The seedling cooler will not be used for storage of products (such as chemicals, fertilizer, or fuel) that are lethal to seedlings or damaging to the cooler unit.
4. The cooler of a refrigerated vehicle will not be painted with dark or heat absorbing colors.

### Non-Refrigerated Vehicles

1. Vehicles used for transporting seedlings will have a light-colored or reflective tarp to shade and protect seedlings.
2. Bags/bundles of seedlings will not be stacked more than two layers deep without the use of spacers (three deep for boxes). Allow 2" to 4" of air space between seedling layers. Adequate air space will be left between the protective cover and the top of the bag/bundle/box to avoid heat buildup.

**CAUTION**

Seedlings can heat excessively (even on a cold day) if vehicle is parked in direct sunlight and seedlings are stacked, preventing air circulation.

3. Do not transport seedlings in truck beds containing fertilizer, chemicals, fuel (backfire fuel), or the residue from chemicals or fuels.
4. Non-refrigerated vehicles will not be used when the temperature is below 32°F or greater than 85°F.
5. Inspect and repair torn or damaged bags/bundles/boxes immediately upon unloading at destination.



# Seedling Storage

Store seedlings in a building, shed or other protective area that will protect seedlings from freezing, heating, direct sunlight and wind. With each delivery of seedlings, rotate stock to ensure the oldest seedlings are planted first.

### Refrigerated Storage

1. Refrigerated coolers will operate at temperatures between 35°F and 38°F with a relative humidity of 80%. The person in charge of caring for the cooler will need to spray the floor with water to maintain the 80% humidity level. A hygrothermograph will be used in all MFC coolers to record temperature and humidity levels.
2. The seedling cooler will not be used for storage of other products (such as chemicals, fertilizer, or fuel) that are lethal to seedlings or damaging to the cooler unit.
3. Bags/bundles will be stacked on pallets or slats and will not be stacked over two deep without spacers (three deep for boxes) to allow air circulation between layers.

### Non-Refrigerated Storage

1. If temperature inside storage area is between 50°F and 70°F, seedlings will be planted within three to five days.
2. If temperature inside storage area is above 75°F, do not store seedlings more than 24 hours.
3. Seedlings will not be stored in bags/bundles/boxes for more than a few hours at temperatures above 85°F:
   - ❒ Lethal temperature occurs in bags/bundles/boxes at 118°F, but seedlings can be weakened or damaged if the temperature in bags/bundles/boxes remains at 85°F for very long.

4. Seedlings should not be stored in an area where the temperature is 32°F or less.
   - ❒ Do not allow seedlings to freeze.
   - ❒ If seedlings are allowed to freeze, follow these steps:
     - Thaw seedlings slowly and naturally. Do not subject seedlings to any artificial heat source.
     - Conduct seedling evaluation before planting.

### On-Site Storage

1. Bags/bundles/boxes will not have prolonged exposure to direct sunlight or wind. Store seedlings in a **shaded** location *and* cover with a **reflective tarp** at all times.
2. Bags/bundles will not be stacked in layers more than two deep without spacers (three deep for boxes). Spacers allow air to circulate freely around the seedlings and keep them cool.
3. Keep close check on the seedlings stored at the site. Inspect and repair torn or damaged bags/bundles/boxes **immediately**. Do not water seedlings sprayed with a super absorbent gel or clay slurry. If roots begin to dry, dip bundles in a tub of water and let soak for several minutes, then plant immediately.
4. Keep an opened bag/bundle closed tightly by folding flap over bag and laying flat-side down or by placing a band or cord firmly around bag/bundle. **Keep in shade and under reflective tarp at all times.**
5. Do not store seedlings on the site if temperatures are expected to be below 32°F or above 85°F. Bags/bundles/boxes will be stored in a building, shed, or other protected area that will protect them from freezing or extreme heat.



# Tree Planting

The key to a seedling's survival after planting is the ability of the root system to quickly begin taking up water and nutrients. The following chart provides guidelines which will help achieve seedlings survival.

**Weather Conditions**

| DAY CLASSIFICATION | TEMP. (° F) | RELATIVE HUMIDITY | WIND | AVAILABLE SOIL WATER | RECOMMENDATIONS |
|---|---|---|---|---|---|
| Ideal | 33° - 75° | 50%+ | less than 10 mph | 75% - field capacity | Excellent conditions for planting |
| Marginal | 76° - 85° | 30% - 50% | 10 - 15 mph | 50% - 75% | Planting is okay. Take precautions to limit seedling exposure. |
| Critical | 32° or less; 85° or greater | 30% or less | 15+ mph | less than 50% | DO NOT PLANT |

**Do not plant if weather forecast indicates extremely cold temperatures that will keep the ground frozen for several days after planting.**

### Root Pruning Seedlings

1. Usually, root pruning should not be necessary for MFC seedlings, which are root wrenched and laterally root pruned at the nursery. ***Notify County Forester before any root pruning is done.*** Vendors contracted for planting under the Forest Resource Development Program (FRDP) must have written approval from County Forester prior to pruning seedlings.
2. Assign only properly trained persons to be responsible for root pruning.
3. If root pruning is necessary, make a special effort to minimize root exposure to sun and wind. Roots must be kept visibly moist at all times. Pruning will be done in a building, shed or other area protected from sun and wind.

4. Prune roots to uniform length. Align root collars in bunches before pruning. Pruning scissors are recommended for root pruning; however, a knife, machete, axe, hatchet or other sharp tool may be used for root pruning. Never break or twist roots off by hand.

| PINE | HARDWOOD |
|---|---|
| Root pruning is only recommended for pine seedlings with lateral or tap roots exceeding 7" in length; only prune back to 7". | Root pruning for hardwood and cypress seedlings is only recommended when tap root exceeds 8" in length; only prune back to 8". Individual lateral roots should not be pruned back to less than 3". |

## Culling Non-Plantable Seedlings

1. Open one bag/bundle/box at a time. Be careful not to leave open more than two minutes.
2. Sort and cull seedlings in a building, shed, or other protective area. Remove a small handful of seedlings at a time. Sort and cull this handful and immediately place in a protective container. Do not allow the roots to be exposed to the sun or wind. Sort and cull only enough seedlings to plant in one hour.
3. For best results assign one trained person to be responsible for culling seedlings. Closely supervise culling procedures. See **Appendix B**, page 16, for recommended standards for grading seedlings.



| PINE | HARDWOOD |
|---|---|
| Cull seedlings that have:<br>❒ Broken, skinned, diseased or weak stems.<br>❒ Diameter at root collar (seedling ground level at nursery) less than 1/8".<br><br>Cull entire bag/bundle/box that has:<br>❒ sour or fermented smell<br>❒ mold on needles<br>❒ slippery bark<br>❒ been allowed to heat up or dry out | Cull hardwood and cypress seedlings with less than 18" top length and 12" top length for native sweet pecan (measured up from the root collar), and with root collars less than 3/8" diameter. |
| ***Contact Area Forester before culling entire bag/bundle/box.*** | |

## Procedures for Hand Planting

1. Train all new personnel prior to allowing them to plant (see **Appendix C**, page 17). Do not assume labor is trained or skilled. Follow-up training may be necessary if poor techniques are observed.
2. MFC's planting jobs will have a foreman to monitor each planter's performance and take corrective action as needed to ensure seedlings are properly cared for and correctly planted.
3. When hand planting, carry seedlings in a bag designed to protect seedlings and free of holes and contamination.
4. Do not carry seedlings in hand with roots exposed. Wait until after the planting hole has been made before removing a seedling from bag. Planting hole should be fairly straight and 8" to

10" deep. Do not use a dibble bar or hoedad that will not make a hole or slit at least 8 inches deep.

5. Leaves, litter, duff, etc., will be removed prior to planting seedling.
6. Do not plant seedlings that were carried "roots up" in the planting bag.
7. Do not use the planting tool to maneuver roots or seedlings into hole.
8. Insert root system to bottom of hole and lift seedling to proper planting depth. Be sure not to twist, bend, ball, or leave roots outside the hole.
9. Adjust planting depth according to drainage or soil type:
   - On well-drained soils (sandy loams and sandy soils) plant root collars no more than 2.5" below ground line except for longleaf. Plant longleaf root collars at ground level when hand planting; lightly cover bud when machine planting.
   - On poorly drained soils (silt and clay soils) plant root collars 1" below ground line.
   - Seedlings will not be planted in excessively wet, sticky soils or in standing water. Allow site to dry before planting.
10. Close hole properly. (If soil is not tightly compressed around roots and collar, moisture cannot be taken up by the seedlings. Air pockets left in planting hole may allow roots to dry out.)
11. Space seedlings as prescribed for the tract. Avoid planting seedlings in areas of loose soil that cannot be compressed around roots. Avoid planting seedlings closer than two to three feet from hardwood stumps and sprouts.
12. Plant seedlings as near to the edge of windrows as possible.
13. **DO NOT CARRY MORE THAN ONE HOUR'S SUPPLY OF SEEDLINGS IN PLANTER BAGS.**
14. All planting should stop when temperature is below 32°F or above 85°F.



## Procedures for Machine Planting

1. Train all new personnel prior to allowing them to plant. Do not assume labor is trained or skilled. Follow-up training may be necessary if poor techniques are observed.
2. For safety, the tractor and tree planting machine should have protective canopies and be equipped with safety chain hookup. Hard hats should be worn.
3. Mechanical tree planters are usually organized into crews of one tractor driver and two alternate tree planters. MFC's planting jobs will have a foreman to monitor each crew's performance and take corrective action as needed.
4. The tractor should have adequate horsepower to pull planter. Do not exceed 2.5 mph.
5. Drawbar hookup should be no more than 14" from ground.
6. Hitch arms for 3-point hitch planter should be the same length to assure straight planting line.
7. Packer wheels should be adjusted out for sandy soils and angled in for clay soils.
8. When machine planting, be sure roots are visibly moist before placing in seedling hopper. Cover roots in hopper with wet material to protect from exposure.
9. Follow **Hand Planting** steps 8 through 14.

**Avoid Common Machine Planting Errors**

| Error | Caused By |
|---|---|
| L-drag root | Holding seedling too long, traveling too fast, not enough weight on planter, and/or planter riding on hardpan. |
| J- or U-root | Planting trench too shallow. |
| Root collar and roots exposed | Planted too shallow; improper planting technique. |

# Tree Planting Compliance Procedures

A compliance check of the planting job is a systematic and unbiased evaluation of the overall quality of the job. Begin making compliance checks soon after planting begins in order to correct errors in planting technique and/or seedling handling.

The Mississippi Forestry Commission will perform compliance checks on cost-share funded planting jobs where the agency has technical responsibility. Compliance checks will also be made on other planting jobs as approved by the District Forester. The MFC will determine if the planting job meets the specifications as called for in the planting plan or prescription.

The procedure for making a tree planting compliance check is discussed below.

1. Determine the number of plots needed for the compliance check. The **minimum** number of sample plots required (based on total acres planted) is:

| **Tract Size** (acres) | **Plots Required** * |
|---|---|
| 1 - 10 | 5 plots |
| 11 - 40 | 1 plot per 2 acres |
| 41 - 100 | 20 plots |
| 101 + | 25 plots |

* PINE: Plot size is 1/100 acre, which has a plot radius of 11'9.3''
* HARDWOOD: Plot size is 1/20 acre, which has a plot radius of 26'4''

2. Plots will be adequately spaced to ensure a representative sample of entire tract is collected.
3. Upon reaching the first plot, mark plot center with flagging. Do not arbitrarily move the plot within the planted area. Number the flag with a permanent felt-tip marker to correspond with plot drawn on map.
4. Count the total number of planted seedlings within plot and enter on the Tree Planting Compliance Form (**Appendix D,** page 19).
5. Examine the seedling ***closest*** to plot center for above and below ground errors. (To check for below ground errors, a seedling must be carefully dug up and planting slit opened to reveal roots. Replant seedling following inspection.) If no error is found, place one check-mark in the "Yes" column, indicating a correctly planted seedling. If errors are found, place one check-mark in the "No" column, indicating an incorrectly planted seedling. Also, enter the appropriate error code(s) as shown on the Tree Planting Compliance Form.

   The following criteria will be used to determine above ground and below ground planting errors:
   - ❒ U-Rooting
   - ❒ L-Rooting (PINE: When more than 1" of tap root is planted horizontally. HARDWOOD: When more than 3/4 length of tap root is planted horizontally.)
   - ❒ Too deep (Seedling planted in excess of 2.5" deeper than root collar.)
   - ❒ Too shallow (Root collar exposed; roots showing above ground.)
   - ❒ Top of slit open
   - ❒ Two or more seedlings in one planting slit
   - ❒ Loose (Seedling can be easily pulled out of planting slit.)
   - ❒ Debris in planting slit
   - ❒ Twisted or balled roots
   - ❒ Improper pruning
   - ❒ Seedling leaning greater than 30° of perpendicular (pine) and 45° for hardwood

6. Continue to next plot. Steps 3 through 6 will be followed for each plot. When compliance check of planted area is complete, determine the following:
   - ❒ Total number of plots taken
   - ❒ Total number of seedlings counted in all plots
   - ❒ Total number of plots checked "Yes" for correctly planted
7. Determine the "**Seedlings/Acre**" by dividing the total seedlings counted in all plots by the total number of plots taken, then multiply by 100 for pine or 20 for hardwood. Enter answer on Tree Planting Compliance Form.
8. Determine "**Correctly Planted**" by dividing the total number of plots checked "Yes" (correctly planted) by the total number of plots taken, then multiply by 100 for both pine and hardwood. Enter answer on Tree Planting Compliance Form.



The Mississippi Forestry Commission follows these standards* in determining an acceptable planting job.

- ❒ Proper care and handling of seedlings.
- ❒ Planting job must be no less than 85 percent correctly planted.
- ❒ Average number of seedlings/acre must be within 50 seedlings/acre of the amount specified in the plan or prescription *AND* fall within the following limits:

| Species | Seedlings/Acre |
|---|---|
| **Pine** | **Plant between 500 and 776** |
| **Containerized Pine & Longleaf** | **Plant 400 minimum** |
| **Bare-root Longleaf** | **Plant 800 minimum** |
| **Cypress** | **Plant 680 minimum** |
| **Hardwood (except cottonwood)** | **Plant between 200 and 435** |
| **Cutover sites** | **Plant 200 minimum** |
| **Open fields** | **Plant 302 minimum** |
| **Cottonwood** | **Plant 300 minimum** |

*These standards meet FRDP requirements. Other specifications may be required for some federally sponsored programs.

# APPENDIX A

## Mississippi Forestry Commission

### SEEDLING RECEIPT

**Name on Order:** _____

**SIF Number:** _____ **District/County:** _____

| Species | Packing Date | # of Seedlings per Bag | # of Bags | Total # of Seedlings |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

I certify by signing below that these seedlings are viable and assume full responsibility. I will notify an MFC forester of seedling shortage or other problems within 48 hours of receipt. If there are survival problems, I acknowledge that I have three weeks from receipt of seedlings to notify an MFC forester for ***any*** consideration for review. ***Time limits beyond these windows will result in absolutely no evaluation.***

_____ _____

*Signature of Person Accepting Seedlings* *Date*

**Weather Conditions at Time of Loading**

**Temp:** _____ °F ☐ Cloudy ☐ Partly Cloudy ☐ Windy

**Time:** _____ ☐ Raining ☐ Sunny ☐ Foggy

**Transportation and Tarp Information**

**Seedlings picked up by:** ☐ County ☐ Landowner ☐ Vendor

**Tarp on hauling vehicle:** ☐ Yes ☐ No

**How were seedlings transported?** ☐ Trunk of car ☐ Back of pick-up truck

☐ Other (Explain):

_____ _____ _____

*MFC Employee Releasing Seedlings* *Title* *Date*

***FORM 750.1*** ***REVISED 10/99***



# APPENDIX B

## Mississippi Forestry Commission's Recommended Standards for Grading Seedlings

### PINE

| Species | Stem (or Needle) Length | Root Collar | Nature of Stem | Bark on Stem |
|---|---|---|---|---|
| Loblolly & Slash | 6" - 14" | 1/8" or larger | Stiff, woody | On lower part at least; often all over |
| Longleaf (bare root) | 6" 8" clipped | 3/16" or greater | No stem present | No stem present |

**For Pine and Hardwood:**
**Cull injured, forked, or diseased seedlings.**

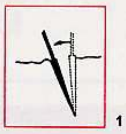
### HARDWOOD

| Species | Root Collar | Top Height | Root Length | Root Laterals |
|---|---|---|---|---|
| Sycamore | 3/8" - 3/4" | 18" | 8" | Abundant |
| Green Ash | 3/8" - 3/4" | 18" | 8" | Abundant |
| Yellow Poplar | 3/8" - 3/4" | 18" | 8" | Abundant |
| Baldcypress | 3/8" - 3/4" | 18" | 8" | Abundant |
| Pecan | 3/8" - 3/4" | 12" | 8" | Abundant |
| Oak (all species) | 5/16" - 3/4" | 18" | 8" | Abundant |

# APPENDIX C

## Hand Planting Procedures

**Planting with Dibble Bar**


1


2


3


4


5


6

1. Insert the dibble straight down into the soil to the full depth of the blade and pull back on the handle to open the planting hole. (DO NOT rock the dibble back and forth as this causes soil in the planting hole to be compacted, inhibiting root growth.)
2. Remove the dibble and push the seedling roots deep into the planting hole. Pull the seedling back up to the correct planting depth. Gently shake the seedling to allow the roots to straighten out. DO NOT twist or spin the seedling or leave the roots J-rooted.
3. Insert the dibble several inches in front of the seedling and push the blade halfway into the soil.
4. Push the dibble down to the full depth of the blade.
5. Pull back on the handle to close the bottom of the planting hole. Then push forward to close the top, eliminating air pockets around the roots.
6. Remove the dibble and close and firm up the opening with your heel. BE CAREFUL to avoid damaging the seedling.





**Planting with Hoedad**


1


2


3


4


5

1. Strike blade almost vertically, full depth of the blade into the soil. Pull up on the handle to break the soil at the bottom hole. **CAUTION**: Avoid raising the handle more than a few inches. The hole will fill with soil and the seedling will be shallow-rooted.
2. Slide hand down handle almost to the blade. Pull back and down on the handle to form a pocket on far side of the blade. With the other hand, immediately roll the seedling roots into the pocket to the full depth of the hole.
3. Hold seedling in place while sliding the hoedad blade out of the hole. Loose soil should fall into the hole, holding seedling in place.
4. Pull blade completely out of the hole and push soil against planted tree with the tip of the blade.
5. Use foot to firm the soil against the seedling. Do not step on or bruise seedling with foot.

# APPENDIX D

## Tree Planting Compliance Form

Landowner: _____

County: _____ Acres: _____

Contractor: _____

Date Inspected: _____ Inspector: _____

| Plot # | Number of Seedlings in Plot | Is the seedling closest to plot center correctly planted? Check (✓) yes or no. If no, enter Error Code(s). *[See reverse for Codes.]* | | |
|---|---|---|---|---|
| | | Yes | No | Error Code(s) |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| 16 | | | | |
| 17 | | | | |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |
| 25 | | | | |
| TOTAL | | | | |





| SEEDLING SOURCE | PLANTING DATES |
|---|---|
| ❑ MFC | Began: _____ |
| ❑ Other: _____ | Ended: _____ |
| Packing Date (if known): _____ | |

### COMPLIANCE RESULTS

Seedlings/Acre: _____

Correctly Planted: _____%

### INSTRUCTIONS

**Seedlings/Acre:** Divide the total seedlings counted in all plots by the total number of plots taken, then multiply by 100 for pine or 20 for hardwood.

**Correctly Planted:** Divide the total number of plots checked "Yes" (correctly planted) by the total number of plots taken, then multiply by 100 for both pine and hardwood.

### Minimum Plots Required

| Planted Acres | Plots Required |
|---|---|
| 1 - 10 | 5 plots |
| 11 - 40 | 1 plot per 2 acres |
| 41 - 100 | 20 plots |
| 101+ | 25 plots |

PINE: Use 1/100 acre plot (11' 9.3" radius)
HARDWOOD: Use 1/20 acre plot (26' 4"radius)

### PLANTING ERRORS

A. U-Rooting
B. L-Rooting
C. Too deep
D. Too shallow
E. Top slit open
F. Multiple trees in site
G. Too loose
H. Debris in slit
I. Twisted/balled roots
J. Improper pruning
K. Leaning (+30 degrees pine) (+45 degrees hardwood)
L. Roots exposed
M. Other. Explain: _____

# APPENDIX E

## Tree Spacing Table

The following is a list of common spacings used for tree planting.

| Spacing (feet) | Seedlings per Acre |
|---|---|
| **PINE** | |
| 6 X 10 | 726 |
| 6 X 12 | 605 |
| 7 X 9 | 691 |
| 7 X 10 | 622 |
| 7 X 12 | 519 |
| 8 X 9 | 605 |
| 8 X 10 | 544 |
| 8 X 11 | 495 |
| 9 X 9 | 538 |
| **HARDWOOD** | |
| 9 X 12 | 403 |
| 11 X 11 | 360 |
| 11 X 12 | 330 |
| 12 X 12 | 302 |
| 13 X 13 | 258 |
| 14 X 14 | 222 |