

rec'd 2-17-99

Daniel R. Spivey  
Box 95A RR1  
Golconda, Il. 62938  
618-683-9031

Scott Ballard  
IDNR  
9053 Route 148, Suite B  
Marion, Il 62959

Dear Scott:

This is a progress report of the work that has been done on my project with the Quercus prinus during the summer and fall of 1998.

During the summer and fall, I collected data at 8 Quercus prinus sites within the Shawnee National Forest. I established 44 permanent plots. At each site, plots were determined by requiring a minimum of 40% basal area of Quercus prinus even to be considered. If an area looked as if it would meet the requirements, a starting point was chosen and random numbers were used to determine plot center. At each round .04 ha plot I collected data on the numbers and type of species in the overstory and understory. Within each .04 ha plot were two microplots located on each major axis making a total of eight microplots. These microplots were .001ha for seedlings and .0025ha for saplings. Data was collected on the number of seedlings and sapling species within each microplot.

Trees at each plot were cored, cores were glued to strips of wood (to be sanded in preparation for counting the individual growth rings) to determine age, needed for calculating site index. Tree height and dbh information were also collected and used in determining site index.

Soil pits were also dug at each plot on each site. Soil samples were taken at the different horizons. Samples were taken to a lab at the university and soil texture analysis test were done for each sample taken (approx. 132 samples). Soil samples will also be sent to a lab in Memphis Tenn., to determine the organic matter and nutrient content.

Data was also collected on the site characteristics of each plot such as slope, shape, location of plot on slope, and plot aspect.

Plot centers still need to be located with a global positioning system. I hope that this can be done this spring.

At the present, I am summarizing my data in preparation for doing my data analysis. I am hoping to finish my work by the end of this spring semester.

Sincerely  
*Daniel R. Spivey*  
Daniel R. Spivey

Daniel R. Spivey  
Box 95A RR1  
Golconda, Il. 62938  
1-618-683-9031

6/24/99

Scott Ballard  
IDNR  
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Marion, Il. 62959  
1-618-993-7023

Dear Scott:

This is a second progress report on the research with the *Quercus prinus* stands that has been requested from me.

During the summer and fall of 1998, data was collected at the different known stands of *Quercus prinus* located within the Shawnee National Forest. As mentioned before, data was collected on the overstory, understory, seedling density, sapling density, forest soils, aspect, topography, and site index.

Field data collection is finished at this time. The previous progress report explains in more detail about the procedures involved with the data collection.

Since the fall of 1998, work has been done on the summarization of the field data. Data for each plot was converted to represent per hectare. This data was then compiled into 40 tables. The data was separated into two different regions, the Shawnee Hills Region and the Ozark Hills Region. The data was then separated into different aspects according to the plots location on slope with regard to direction for each stand location. This allowed the data to be categorized as either being located on a ridge top, on a north slope or on a south slope. This was how the first 30 tables were organized using the basal area, overstory tree density, seedling density, sapling density, and understory density. The last 10 tables are a compilation of the first 30 tables using average basal area, standard deviation, and average relative basal area for the north, south, and ridge top locations in each of the two different regions according to basal area, overstory tree density, seedling density, sapling density, and understory density. These tables are basically finished at this point. These last 10 tables will probably be used in the body of the research paper, and the first 30 tables will be added into the appendix.

At this point, data has been summarized (dependent and independent variables) to be used in a stepwise regression statistical analysis program. Seedling and sapling density are the dependent variables to be used to determine if there are any relationships between the dependent variables and any of the independent variables, (overstory basal area, *Quercus prinus* basal area, % slope, % sand, % silt, % clay, aspect, site index, and available water content).

I would like to thank you Scott, along with the Wildlife Preservation Fund, for your help on my research project. I hope when the project is finalized that there is some useful information to be had. I would also like to add that at your request upon completion of the data analysis and thesis, 2 copies of the thesis will be sent, one to you and another to the Springfield office staff. Dr. Zaczek and I will also send any reprints of any anticipated journal publications when they become available.

I am also enclosing a copy of the table of data summarized for running the stepwise regression analysis.

Sincerely

  
Dan Spivey

| plot # | DnQPSe/ha | DnQPSa/ha | BAoverst | BAQp   | %slope | %sand | %silt | %clay | avail H2O | site index | A'   |
|--------|-----------|-----------|----------|--------|--------|-------|-------|-------|-----------|------------|------|
| 1.1    | 50000     | 1600      | 31.867   | 29.863 | 31     | 30    | 53    | 17    | 7.334     | 36.5       | 1.29 |
| 2.1    | 16000     | 0         | 27.844   | 17.459 | 36     | 28    | 53    | 19    | 7.471     | 56         | 1.57 |
| 3.1    | 158000    | 2800      | 31.116   | 17.334 | 21     | 11    | 59    | 30    | 19.17     | 50         | 1.54 |
| 4.1    | 186000    | 6800      | 25.36    | 23.547 | 24     | 13    | 58    | 29    | 11.79     | 43         | 1.42 |
| 5.1    | 104000    | 3600      | 26.571   | 15.22  | 28     | 34    | 49    | 18    | 16.22     | 48         | 1.33 |
| 6.1    | 13000     | 0         | 25.04    | 13.631 | 22     | 18    | 60    | 22    | 16.22     | 58         | 1.26 |
| 7.1    | 38000     | 0         | 21.269   | 21.269 | 27     | 37    | 43    | 20    | 6.019     | 25         | 0.46 |
| 8.1    | 129000    | 400       | 22.214   | 22.214 | 19     | 36    | 47    | 17    | 13.3      | 33         | 0.41 |
| 9.1    | 136000    | 1200      | 31.488   | 22.997 | 16     | 7     | 60    | 33    | 16.49     | 41         | 1.09 |
| 10.1   | 60000     | 0         | 36.234   | 31.154 | 15     | 8     | 57    | 35    | 16.96     | 47         | 1.78 |
| 11.1   | 49600     | 400       | 19.501   | 16.329 | 14     | 7     | 63    | 30    | 21.1      | 53         | 1.14 |
| 12.1   | 0         | 800       | 24.398   | 16.537 | 10     | 14    | 55    | 31    | 16.55     | 45         | 1.42 |
| 13.1   | 70000     | 800       | 20.036   | 10.976 | 3      | 15    | 53    | 32    | 12.03     | 62         | 1.98 |
| 14.1   | 18000     | 0         | 40.513   | 25.28  | 35     | 16    | 43    | 41    | 3.168     | 66         | 1.98 |
| 15.1   | 96000     | 1600      | 28.666   | 24.248 | 21     | 7     | 65    | 28    | 19.55     | 49         | 1.09 |
| 16.1   | 43000     | 1200      | 35.746   | 35.746 | 41     | 36    | 49    | 15    | 11.56     | 58         | 0.55 |
| 17.1   | 44000     | 1600      | 16.273   | 11.673 | 23     | 40    | 39    | 21    | 18.44     | 40         | 0.37 |
| 18.1   | 4000      | 0         | 26.348   | 24.038 | 30     | 53    | 32    | 15    | 4.261     | 0          | 1.14 |
| 19.1   | 107000    | 4000      | 26.911   | 15.66  | 21     | 27    | 54    | 19    | 14.7      | 0          | 0.43 |
| 20.1   | 44000     | 3600      | 16.55    | 9.71   | 38     | 61    | 28    | 11    | 3.61      | 34         | 0.91 |
| 21.1   | 93000     | 1200      | 17.322   | 14.274 | 11.5   | 50    | 37    | 13    | 4.98      | 30         | 1.64 |
| 22.1   | 66000     | 800       | 27.147   | 19.26  | 50     | 35    | 50    | 15    | 5.89      | 57         | 0.55 |
| 23.1   | 20000     | 1200      | 26.239   | 9.333  | 36     | 17    | 65    | 18    | 12.1      | 37         | 0.88 |
| 24.1   | 93000     | 2400      | 16.668   | 9.347  | 26     | 11    | 59    | 30    | 16.6      | 44         | 1.36 |
| 25.1   | 88000     | 400       | 27.363   | 21.772 | 7      | 13    | 60    | 27    | 9.924     | 45         | 0.05 |
| 26.1   | 51000     | 2000      | 30.932   | 26.198 | 41     | 14    | 71    | 15    | 8         | 31         | 0.40 |
| 27.1   | 70000     | 800       | 21.594   | 20.712 | 22     | 16    | 69    | 15    | 6.738     | 20         | 0.21 |
| 28.1   | 39000     | 4800      | 22.795   | 12.558 | 29     | 24    | 61    | 15    | 3.335     | 37         | 0.18 |
| 29.1   | 76000     | 1600      | 15.324   | 15.324 | 59     | 30    | 52    | 18    | 3.561     | 55         | 0.09 |
| 30.1   | 23000     | 400       | 17.013   | 11.729 | 37     | 17    | 61    | 22    | 18.569    | 53         | 0.05 |
| 31.1   | 5000      | 400       | 28.539   | 9.376  | 25     | 18    | 65    | 17    | 15.184    | 58         | 1.37 |
| 32.1   | 34000     | 1200      | 33.252   | 19.971 | 37     | 13    | 65    | 22    | 17.153    | 60         | 0.12 |
| 33.1   | 34000     | 400       | 33.051   | 27.582 | 72     | 11    | 66    | 23    | 14.672    | 51         | 1.05 |
| 34.1   | 105800    | 1200      | 27.808   | 9.729  | 21     | 9     | 69    | 22    | 18.008    | 51         | 0.16 |
| 35.1   | 72000     | 0         | 42.458   | 31.654 | 40     | 7     | 66    | 27    | 17.822    | 61         | 1.88 |
| 36.1   | 49000     | 1600      | 18.68    | 15.281 | 39     | 11    | 62    | 27    | 18.253    | 45         | 1.33 |
| 37.1   | 54000     | 400       | 32.65    | 23.889 | 40     | 19    | 65    | 16    | 4.514     | 46         | 1.03 |
| 38.1   | 50000     | 800       | 37.24    | 36.175 | 37     | 20    | 65    | 15    | 4.309     | 51         | 0.04 |
| 39.1   | 80000     | 2800      | 29.787   | 24.625 | 36     | 29    | 58    | 13    | 2.356     | 42         | 0.25 |
| 40.1   | 42000     | 2400      | 42.19    | 32.597 | 20     | 15    | 59    | 26    | 14.787    | 53         | 0.67 |
| 41.1   | 139000    | 800       | 26.921   | 26.921 | 40     | 17    | 68    | 15    | 8.085     | 45         | 0.40 |
| 42.1   | 55000     | 0         | 43.012   | 39.565 | 65     | 42    | 47    | 11    | 4.714     | 0          | 1.19 |
| 43.1   | 56000     | 800       | 43.432   | 38.865 | 41     | 19    | 65    | 16    | 6.751     | 47         | 1.29 |
| 44.1   | 31000     | 0         | 40.646   | 38.867 | 45     | 47    | 28    | 25    | 4.316     | 61         | 0.74 |

Determining the Distribution, Site Relationships, and Successional Trends  
of Chestnut Oak in Illinois

**Proposed by:** James J. Zaczek and Daniel R. Spivey, Assistant Professor of Forest Ecology and Graduate Student, respectively, Department of Forestry, Southern Illinois University, Carbondale, IL 62901-4411

**Estimated Cost:** \$1,000

**Justification:** Chestnut oak (*Quercus prinus* L.) is an important tree species native to southern Illinois and distributed across east-central North America. The species is an integral component of many mature mixed-oak forests especially on dry, nutrient-poor uplands (McQuilkin 1990). Although its' wood is valuable and sold as white oak, on these severe xeric sites the primary value of chestnut oak is largely nonconsumptive. It provides vegetative cover for watershed protection and it is considered to be highly important for food, cover, and habitat for many species of wildlife. Additionally, because it tends to occur on upland slopes and ridges, the species provides important aesthetic and recreational value as a component of the scenic panorama (Smith 1995). Past periodic disturbances such as fire, drought, and cutting have aided in the persistence of the species (Abrams 1992, Parker and Merritt 1995). However, changes in disturbance regimes over recent decades, especially fire suppression, are resulting in successional replacement of many oak forests by shade tolerant species. This is of particular concern in Illinois where chestnut oak is currently state-listed as a threatened species.

There is a need to document the current distribution, site relationships, and apparent successional trends of chestnut oak in Illinois to help manage the species. This proposed research will identify, monument, and document several natural chestnut oak stands in southern Illinois in order to determine the current successional status and provide baseline information to help assess future trends in the occurrence and persistence of the species.

**Objectives:** The objectives of this study are to: a) identify, locate, and document stands of chestnut oak in southern Illinois b) determine stand structure, composition, relative importance of overstory and understory tree species of several of the larger chestnut oak stands c) make management recommendations for the species. This proposal will serve to better understand the chestnut oak resource and provide important baseline information for future monitoring and management of the species.

**Methods:**

- 1) Locate, describe, and establish permanent research plots at Atwood Ridge Research Natural Area, Dennison Hollow, Cave Hill, High Knob, Reids Chapel, Provo Cemetery, Big Brushy, and Finneyville Cemetery sites in Alexander, Gallatin, Hardin, Saline, and Union Counties within the Shawnee National Forest.
- 2) Describe, analyze, and classify the overstory composition and understory regeneration for several of the larger populations of chestnut oak communities.
- 3) Relate vegetation to environmental factors such as slope position and angle, aspect, elevation, soil factors, and any apparent past disturbances.

**Duration:** 1 July 1998 to 30 June 1999.

**Literature Cited:**

Abrams, M. D. 1992. Fire and the development of oak forests. *Bioscience* 42:346-353.

McQuilkin, R. A. 1990. *Quercus prinus* L. chestnut oak. *In*, *Silvics of North America*. Edited by R. M. Burns and B. H. Honkala. USDA Agric. Handbook 654. pp. 721-726.

Parker, G. R., and C. Merritt. The central region. *In*, *Regional Silviculture of the United States*. Edited by J. W. Barrett. John Wiley and Sons. New York. pp. 129-172.

Smith D. W. 1995. The southern Appalachian Hardwood Region. *In*, *Regional Silviculture of the United States*. Edited by J. W. Barrett. John Wiley and Sons. New York. pp. 173-226.

**Budget and Funds Provided:** See attached.

**Professional Vitae:** See attached.

Curriculum Vitae  
**JAMES J. ZACZEK**  
March 24, 1998

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**Education**

- 1991-94    **Ph.D. Forest Resources**, Pennsylvania State University, University Park, PA.  
Genetic, Ontogenetic, and Environmental Influences on Cloning Performance of  
*Quercus rubra* L.
- 1980-82    **M.S. Forest Genetics**, Southern Illinois University, Carbondale, IL. Evaluating  
Southern Appalachian Eastern White Pine *Pinus strobus* L. Provenances in Southern  
Illinois.
- 1976-80    **B.S. Forest Resource Management**, Southern Illinois University, Carbondale, IL.
- 1975-76    Forest Biology, Colorado State University, Fort Collins, CO.

**Experience**

- 1997 to present      Assistant Professor of Forest Ecology, Department of Forestry,  
Southern Illinois University, Carbondale, IL.
- 1996 - 1997      Senior Research Assistant of Forest Biology, Faculty, School of Forest  
Resources, Pennsylvania State University, University Park, PA.
- 1993 - 1997      Affiliated Faculty, Biotechnology Institute, Pennsylvania State  
University, University Park, PA.
- 1983 - 1996      Research Assistant of Forest Biology, Faculty, School of Forest  
Resources, Pennsylvania State University, University Park, PA.

**Academic Interests**

Biology, ecology, and genetics of trees with emphasis on oaks; silviculture; natural and artificial regeneration of forested ecosystems; agroforestry, age-related changes and growth determination in woody plants; propagation of trees; Christmas tree breeding and culture.

## Refereed Publications

- Zaczek, J. J., and K. C. Steiner. 1997. Grafting-mediated meristem selection influences rooting performance of *Quercus rubra* L. *Can. J. For. Res.* 27:86-90.
- Zaczek, J. J., K. C. Steiner, and T. W. Bowersox. 1997. Northern red oak planting stock: 6-year results. *New Forests* 13:177-191.
- Zaczek, J. J., J. Harding, and J. Welfley. 1997. Impact of soil scarification on the composition of regeneration and species diversity in an oak shelterwood. *In Proceedings 11th Central Hardwood Forest Conference March 23-26, 1997, Columbia, MO. Edited by S. G. Pallardy, R. A. Cecich, H.G. Garrett, and P. S. Johnson. USDA Forest Serv. Gen. Tech. Rep. NC-188, pp. 341-348.*
- Zaczek, J. J., C. W. Heuser, Jr., and K. C. Steiner. 1997. Effect of shade levels and IBA during the rooting of eight tree taxa. *J. Envir. Hortic.* 15(1):56-60.
- Zaczek, J. J., K. C. Steiner, and R. D. Shipman. 1994. Performance of Japanese and hybrid larch progenies in Pennsylvania. *Northern J. Appl. Forestry* 11(2):53-57.
- Zaczek, J. J., K. C. Steiner, and T. W. Bowersox. 1993. Performance of northern red oak planting stock. *Northern J. Appl. Forestry* 10(3):105-111.
- Zaczek, J. J., K. C. Steiner, and C. W. Heuser, Jr. 1993. Vegetative propagation of mature and juvenile northern red oak. *In Proceedings 9th Central Hardwood Forest Conference 8-10 March 1993, West Lafayette, IN. Edited by Andrew R. Gillespie, George R. Parker, and Phillip E. Pope. USDA Forest Serv. Gen. Tech. Rep. NC-161, pp. 210-221.*

## Grants and Contracts

- |              |   |
|--------------|---|
| 1994 to 1998 | Genetics and Regeneration of Northern Red Oak and Other Pennsylvania Hardwoods. Pennsylvania Agricultural Experiment Station. K. C. Steiner and J. J. Zaczek (Investigators).   |
| 1997         | Determining Optimal Duration of Exposure to Low Light Levels During Rooting of Difficult-to-Root Woody Plants. Horticultural Research Institute. J. J. Zaczek, C. W. Heuser, Jr., and K. C. Steiner (Investigators).                                      |
| 1995         | Evaluating the Effectiveness of Low Light During Rooting of Difficult-to-Root Woody Plants. Horticultural Research Institute and the J. Frank Schmidt Charitable Trust. J. J. Zaczek, C. W. Heuser, Jr., K. C. Steiner, and F. W. Witham (Investigators). |
| 1991 to 1997 | Genetic Improvement of Christmas Trees. Pennsylvania Tree Improvement Program (Penn-TIP). J. J. Zaczek and H. D. Gerhold (Investigators).   |

Year 1

|  | Salary  | # Mos. | % time | P/M  | Agency  | # Mos. | % time | P/M  | SIU     |
|--|---------|--------|--------|------|---------|--------|--------|------|---------|
| <b>A. Professional Staff</b>                     |         |        |        |      |         |        |        |      |         |
| 1. James Zaczek                                  | 4778.00 | 0.00   | 0.00   | 0.00 | 0.00    | 9.00   | 0.05   | 0.45 | 2150.00 |
| Subtotal:  |         |        |        | 0.00 | 0.00    |        |        | 0.45 | 2150.00 |
| <b>B. Other Personnel</b>                        |         |        |        |      |         |        |        |      |         |
| 1. Daniel Spivey                                 | 0.00    | 0.00   | 0.00   | 0.00 | 0.00    | 0.00   | 0.00   | 0.00 | 0.00    |
| Subtotal:  |         |        |        | 0.00 | 0.00    |        |        | 0.00 | 0.00    |
| <b>C. Subtotal Personnel</b>                     |         |        |        |      | 0.00    |        |        |      | 2150.00 |
| <b>D. Fringe Benefits for Professional Staff</b> |         |        |        |      |         |        |        |      |         |
| 1. Retirement @ 10.46%                           |         |        |        |      | 0.00    |        |        |      | 225.00  |
| 2. Medical/Dental/Life @ \$640/per.mo.           |         |        |        |      | 0.00    |        |        |      | 288.00  |
| Subtotal:  |         |        |        |      | 0.00    |        |        |      | 513.00  |
| <b>E. Equipment</b>                              |         |        |        |      |         |        |        |      |         |
| Subtotal:  |         |        |        |      | 0.00    |        |        |      | 0.00    |
| <b>F. Travel</b>                                 |         |        |        |      |         |        |        |      |         |
| 1. Travel to collection sites (8)                |         |        |        |      | 700.00  |        |        |      |         |
| Subtotal:  |         |        |        |      | 700.00  |        |        |      | 0.00    |
| <b>G. Commodities</b>                            |         |        |        |      |         |        |        |      |         |
| 1. Fence posts                                   |         |        |        |      | 125.00  |        |        |      |         |
| 2. Flagging & permanent tags                     |         |        |        |      | 40.00   |        |        |      |         |
| 3. Soil collection bags                          |         |        |        |      | 30.00   |        |        |      |         |
| 4. Slide film                                    |         |        |        |      | 75.00   |        |        |      |         |
| Subtotal:  |         |        |        |      | 270.00  |        |        |      | 0.00    |
| <b>H. Contractual</b>                            |         |        |        |      |         |        |        |      |         |
| 1. Film processing                               |         |        |        |      | 30.00   |        |        |      |         |
| Subtotal:  |         |        |        |      | 30.00   |        |        |      | 0.00    |
| <b>I. Direct Costs</b>                           |         |        |        |      | 1000.00 |        |        |      | 2663.00 |
| <b>J. Indirect Costs (0%)</b>                    |         |        |        |      | 0.00    |        |        |      | 1092.00 |
| Unrecovered Indirect Costs @ 41%                 |         |        |        |      |         |        |        |      | 410.00  |
| <b>K. Total Project Costs</b>                    |         |        |        |      | 1000.00 |        |        |      | 4165.00 |