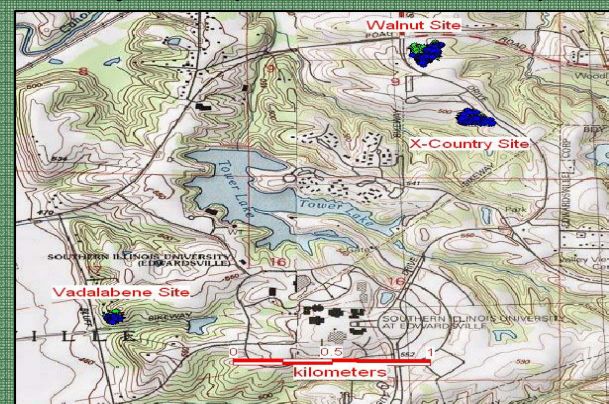


# Seed Germination and Seedling Survivorship on Secondary Succession Sites on the SIUE Campus

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## Introduction

The SIUE campus was established in 1965 from a group of working farms. The farm fields were abandoned at the time and have grown into forest. Shifting use of the land by the university since 1965 has resulted in the abandonment of more land. Our question is: "Can this land be recolonized by planting seeds?" Burr Oak (*Quercus macrocarpa*), Red Oak (*Quercus rubra*), and Black Walnut (*Juglans nigra*) were planted at three sites on campus. Seeds were also tested with tetrazolium for viability. We tested the hypothesis that recolonization is limited by seed availability and competition with herbaceous species.



## Materials and Methods

Burr Oak and Red Oak seeds were acquired from Sheffield Seeds Co., NY, and Black Walnut seeds were collected locally around Edwardsville, IL. Burr Oak and Red Oak seeds were stored at 5°C and Walnut seeds were stored at room temperature. From October to December of 2004, seeds were planted using a dibbler, and flags were placed next to each hole. The flags were checked monthly from June to August for germination.

To test viability, 50 seeds of each species were washed with soap and water and then soaked for 15 minutes in a 0.25% Chlorox bleach solution to sterilize the surface. Seeds were cut in half using pruning shears and placed in Petri dishes filled with 20 mL of 0.1% tetrazolium chloride. The Petri dishes were then placed in the dark for 48 hours. Seeds

## Results



Germination and Viability of Three Tree Species

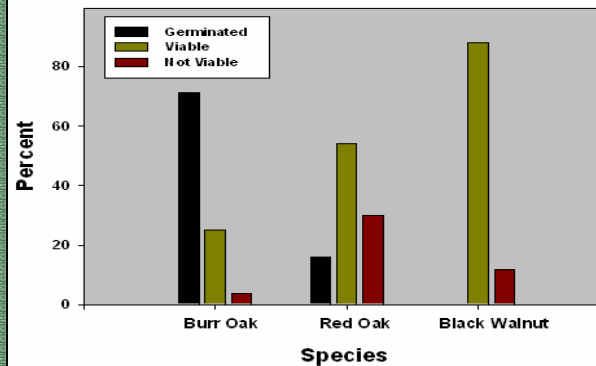


Figure 1: Germinated seeds were those that formed roots while in storage. Viable seeds tested positive with tetrazolium, and not viable seeds tested negative.

Survival and Total Viability of Three Tree Species

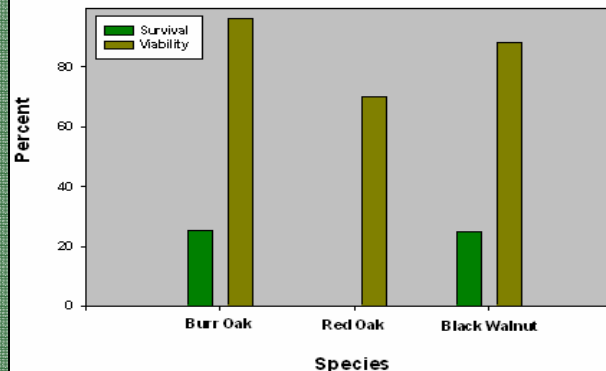


Figure 2: Total viability is a combination of germinated seeds and seeds that tested positive. Survival represents seeds in the field that produced living seedlings.

## Discussion

Sork (1983) performed a similar study using hickories (*Carya glabra*) that showed a survivorship that varied from approximately 5 to 32%. Our study showed similar results: 25.2% for Burr Oaks, 0% for Red Oak, and 24.7 % for Walnuts.

Burr Oak seedlings planted in old growth fields under wet and dry conditions had a survivorship of approximately 57% to 97% respectively (Davis et al. 1999). As illustrated in Table 1, the growing conditions from May to August of 2005 were hotter with less precipitation. These factors may have contributed to our low survival percentages compared to the percentages of viable seeds.

	May	June	July	August
2005 Temperature (°F)	63.6	78.6	81.5	81.3
Average Temperature (°F)	65.2	74.4	78.5	76.6
2005 Precipitation (in)	1.2	3.5	2.7	6.7
Average Precipitation (in)	4.5	3.8	3.8	3.2

Table 1: Average temperature and precipitation were calculated from data collected from the Alton Climatology station from 1948 to 2004.

The differences between sources and storage of seeds may confound the results, but seeds used in the viability test are comparable to those used in a continuation of this project to be analyzed in May 2006.

## Conclusion

Herbaceous vegetation impedes tree seedling growth when competing for water resources. Seedling recruitment is limited both by survival and dispersal.

## References

- Davis, M. A., et al. 1999. *Survival, growth, and photosynthesis of tree seedlings competing with herbaceous vegetation along a water-light-nitrogen gradient*. Plant Ecology 145:341-350.
- Sork, L. V. 1983. *Distribution of pignut hickory (Carya glabra) along a forest to edge transect, and factors affecting seedling recruitment*. Bull. Torrey Bot. Club. 110:494-506.

