BRISTLY LOCUST:

Successful Establishment in an Emulated Organic Silvopasture

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Introduction

Bristly locust (*Robinia hispida*) is a nitrogen-fixing[3], native legume shrub with an extensive range throughout much of the continental US (Fig. 1). Bristly locust resembles a shrub form (0.6-3 m tall) of black locust (*R. pseudoacacia*), produces pink flowers, and the branches, petioles, flower stalks, and seed pods are covered with soft, inoffensive bristles. There have been few agronomic studies. As a triploid with irregular meiosis, high pollen sterility, and low seed yield, bristly locust might lack genetic diversity[4,6].

Tree legumes may have a particular niche as rotational livestock browse when seasonal heat and drought stress limit herbage options and livestock productivity[2]. Whole plant samples of bristly locust from Illinois[5] had high concentrations of crude protein (24.1%). Foliage of tree legumes like black locust and mimosa (*Albizia julibrissin*) have moderate levels of digestible protein that can partially supply the nutritional needs of cattle and goats[1]. Preliminary data suggest that bristly locust leaves in July compare favorably in crude protein (18.0%) to sericea lespedeza, *Lespedeza cuneata* (14.6%) and black locust (24.7%). To our knowledge, bristly locust browse has not been tested for presence/absence of toxic or anti-nutritional factors, e.g., glycoprotein.

Silvopasture is the intentional co-integration and management of tree, herbage, and livestock components on the same land area to optimize land use and profitability. Tree species differ significantly in their ability to compete with weeds, so BMP for non-organic silvopasture establishment usually include herbicides to suppress the existing vegetation and facilitate tree establishment. Small-scale livestock producers may be unwilling or unable to absorb the costs of herbicide application and temporary loss of the land base for pasture renovation. Further, organic BMP usually allow no herbicide weed suppression.

Objective

Determine bristly locust establishment in a silvopasture using emulated organic practices.

Materials and Methods

- **The study was conducted near Booneville, Arkansas (35°N, 94°W), 150 m asl, in a goat pasture.**
- **Trees originated from a nearby waste area. From 27 February to 5 March 2009, dormant trees 1 to 2 m-tall were topped at 0.8 m, dug intact to a rooting depth of about 15 cm with a backhoe, and immediately transplanted in the pasture (1-4% slope) on the same soil type (Enders silt loam).**
- **At planting, trees had a mean basal stem diameter of 2.3 cm.**
- **Clumps of one to five trees were transplanted by backhoe in each of 237 holes (total of 446 trees). The pasture was dominated by bermudagrass and sericea lespedeza. No chemical weed suppression was used for establishment.**
- **Plot spacing was 3.0 m x 3.6 m, or 925 plots/ha.**
- **The pasture received no supplemental fertilization for more than two years before trees were planted, and no soil amendments were applied during the study. Soil was moderately acidic (pH 5.6) and relatively fertile.**
- **The pasture was mowed in strips in spring 2009 before planting. Alleys between tree rows were mowed once in spring 2010 but not in 2011.**
- **Measurements:**
  - **Bud break on 2, 5, and 8 April 2010 (Fig. 2).**
  - **Live tree counts on 11 August 2009, 28 April 2010, and 20 May 2011 (Fig. 3).**
  - **Number of shoots/plot on 20 May 2011.**
  - **Radius of shoot (rhizome) spread from the initial plot on 20 May 2011.**
- **Mature Spanish meat goats (n=42) were introduced for 2 hours/day grazing from 14-21 July 2010, to observe browse behavior.**
- **Area was continuously grazed by 9 doe kids for 5 weeks during summer 2011.**

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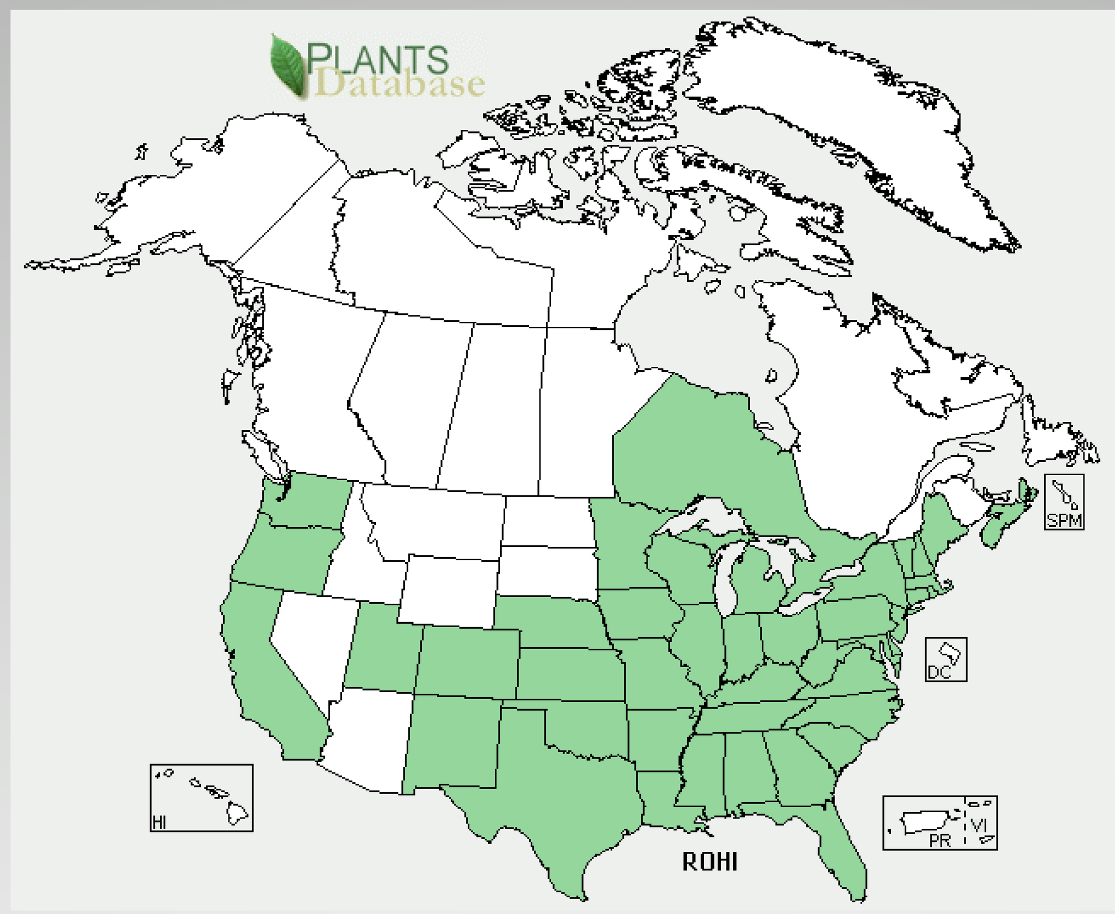

Figure 1. Bristly locust is widely distributed in the US (courtesy USDA, ARS, NRCS http://plants.usda.gov/java/profile?symbol=ROHI)

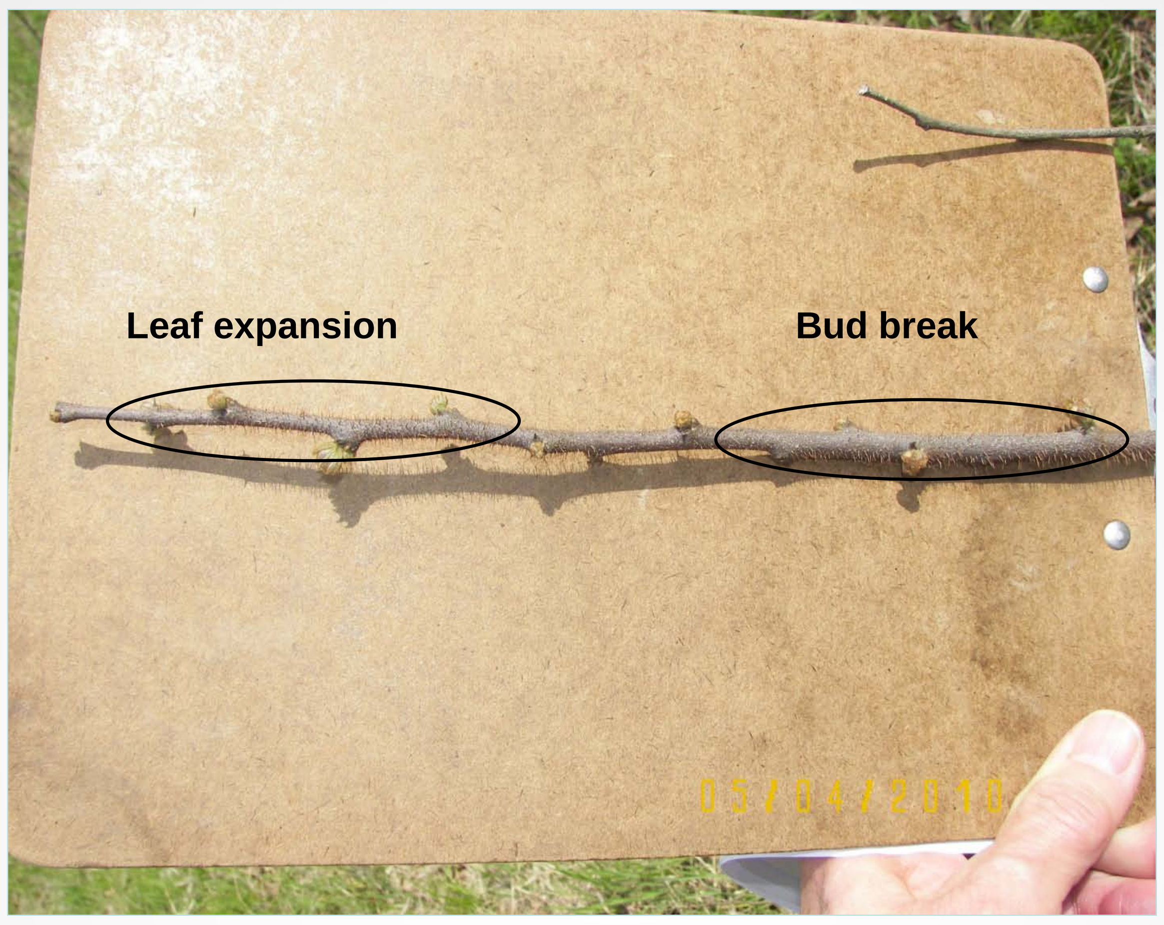

Figure 2. Bud break of bristly locust in April 2010 near Booneville, AR.

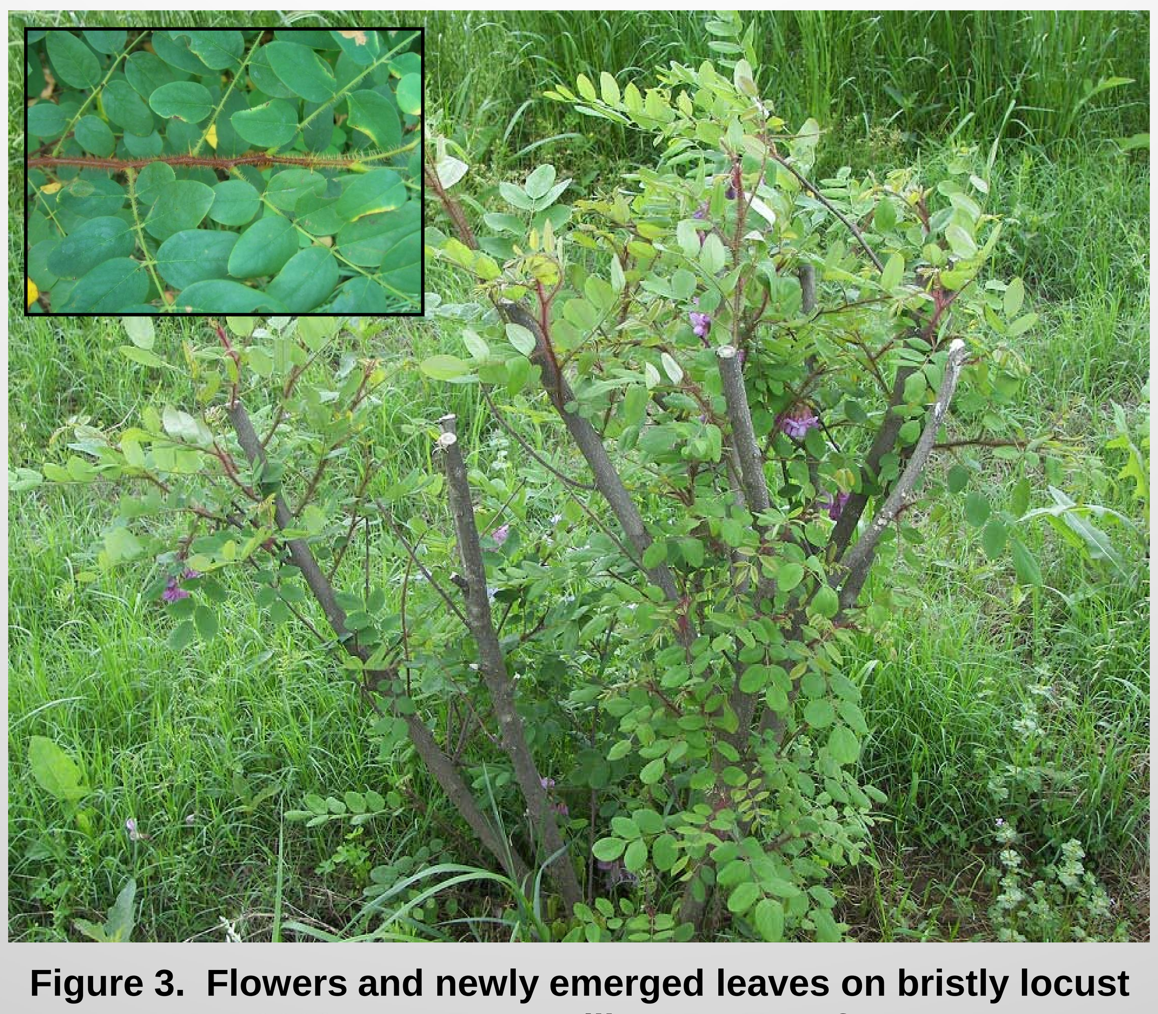

Figure 3. Flowers and newly emerged leaves on bristly locust stems, May 2009, near Booneville, AR. Note fuzzy appearance of new branches caused by bristles (inset).

Figure 4. Bristly locust shoots (center) spreading from original tree (left) in silvopasture alleys, May 2011, near Booneville, AR. Colored sections on pole are 25 cm-long.

Figure 5. Goats browsing bristly locust in July 2010 near Booneville, AR. Note bark damage and abundant herbaceous and woody browse.

Results

- **Climatic conditions were mild the establishment year.**
- **Actual trees/plot decreased about 50% from 0 months (2.5 trees/plot) to 5 months and 1 year (1.3 trees/plot on each date).**
- **Planting rates of two or three trees/plot produced more survivors (2.5 and 3.0 trees/plot, respectively) than planting one tree/plot (1.9 trees/plot), while planting rate of four trees/plot was intermediate.**
- **At 2 years, there was a mean of 5.3 shoots/plot (range 0 to 26 shoots/plot) from rhizomes, significantly more than at previous sampling dates.**
- **New shoots arose 1.4 m from the original clump (range 0.5-2.4 m) and spread was not affected by number of initial trees/plot (Fig. 4).**
- **Goats readily browsed bristly locust and herbaceous plants during 2010 and 2011. As expected, goats caused minor damage to tree bark due to browsing and horn rubbing (Fig. 5), and they trampled smaller trees and sprouts.**
- **Post-study, trees completely recovered in spring 2012 following continuous winter 2011 grazing and virtually complete bark removal.**
- **A study is being conducted on foliar nutritive value.**

Summary and Conclusions

1. **Bristly locust was successfully established in an upland silvopasture using organic methods.**
2. **Trees established and proliferated with only minimal suppression of the existing warm-season grass-legume sward.**
3. **Planting up to three trees/plot improved survival, but not shoot production or plant spread at 2 years post-planting.**
4. **Bristly locust was suited for organic browse due to high survival and shoot production under competition.**
5. **A woody species which produces abundant shoots is advantageous and desirable for production and potential feed value of goat browse.**
6. **Further research is needed on nutritive value, anti-nutritional factors, anthelmintic properties, and grazing management.**

References

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