

# 2010 Kentucky Coffeetree Collection Trip

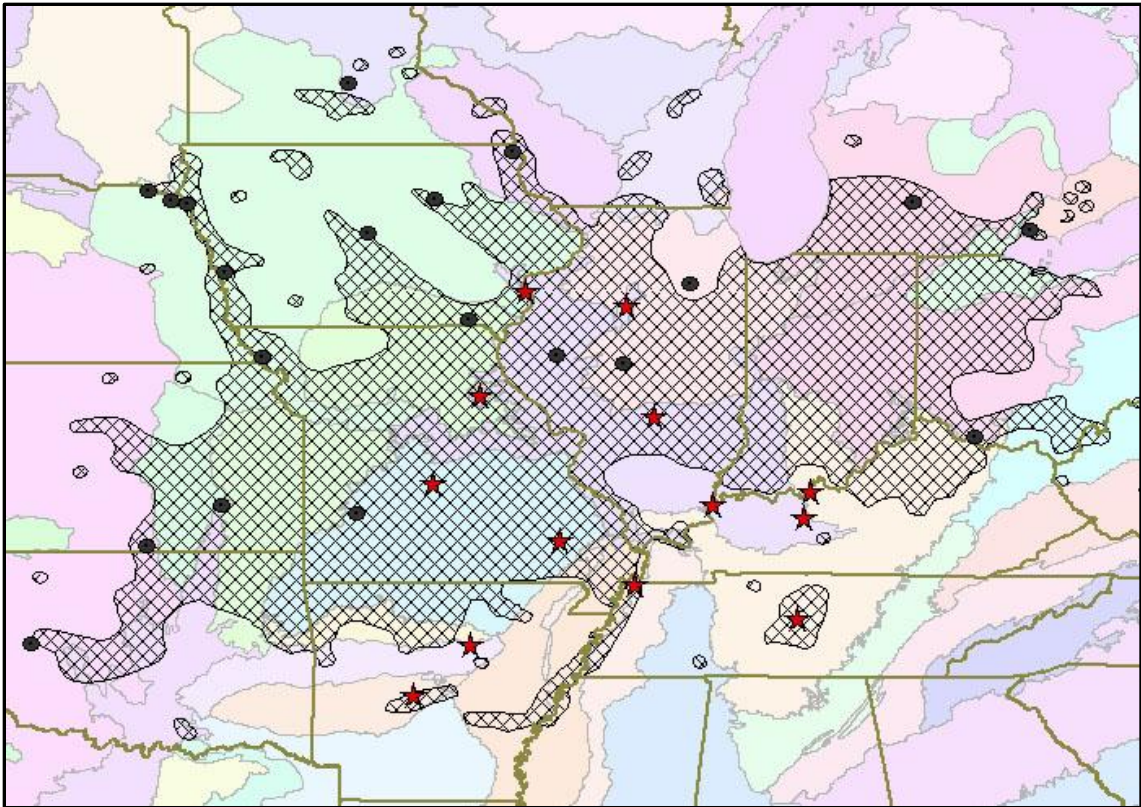
February 17-24, 2010



United States Department of Agriculture

The Brenton Arboretum

# NC7 *Gymnocladus dioicus* Sites



● Past accessions

★ New accessions

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# Introduction

The USDA-ARS Plant Introduction Station (Ames, IA) and the Brenton Arboretum (Dallas Center, IA) completed a collection trip to Missouri, Arkansas, Tennessee, Kentucky, Illinois and Iowa in 2010. Funding was supported by the USDA Plant Exploration Program, which is coordinated by the Plant Exchange Office, National Germplasm Resources Laboratory, USDA-ARS, Beltsville, Maryland. Participants included:

- **Jeffrey D. Carstens**, Agricultural Science Research Technician, USDA-ARS Plant Introduction Station, Ames, IA (left)
- **Andrew P. Schmitz**, Horticulturist, Brenton Arboretum, Dallas Center, IA (right)



The objectives were to:

- Identify and collect *Gymnocladus* populations and potentially other NPGS genera in Missouri, Arkansas, Tennessee, Kentucky, Illinois, and Iowa in 2010
- Store and backup collections at the USDA-ARS Plant Introduction Station and the National Center for Genetic Resources Preservation in Fort Collins, Colorado, respectively
- Ultimately conserve and preserve genetic diversity of *Gymnocladus* germplasm
- Use germplasm to build a living collection, located at the Brenton Arboretum, Dallas Center, IA, of *Gymnocladus* from populations across its native range

# Importance of *Gymnocladus dioicus*

Kentucky Coffeetree is a hardwood, deciduous tree that can potentially reach 30 meters in height. In nature, specimens are typically found on either limestone bluffs or rich soils of bottomlands. It has a fairly large geographical range mainly within the states of the Midwestern U.S. and a few more outlying states in the east. Following the major rivers and watersheds within this range, the tree is typically found as scattered individuals and typically does not make up a large percentage of the forest canopy. Due to this rarity, seed collections are warranted in order to preserve genetic diversity.

The Kentucky coffeetree has many exciting attributes which make it an outstanding tree to plant. It has no serious insect or disease problems and is quite adaptable to urban soil conditions, drought, and flooding. In addition, this species is highly resistant to breaking under ice storms. Reddish brown to dark black seed pods, ranging in size from 5" to 10" long and 1-2" wide, persist throughout the entire winter providing winter interest. Coinciding with its native distribution, this species comprises only a small percentage of most urban landscapes, and can help diversify urban forests. These qualities make it one of the likely candidates to replace ash trees affected by the Emerald Ash Borer, as well as oaks being affected by oak wilt within our cities.

In addition to preserving the genetic diversity of *G. dioicus*, the Brenton Arboretum's focus on collecting this species is to make a conservation collection of numerous populations across its native range. This assemblage, with its genetic diversity, will allow the arboretum to attain information on cold hardiness, overall growth habits, growth rates and phenology (e.g. leaf expansion/senescence, flowering, fruiting, fall color, etc). With time, this collection will allow the Brenton Arboretum to apply to the North American Plant Collections Consortium and obtain national recognition.

# Collection Trip Plan

## **Wednesday, 17 February 2010**

Mark Twain Lake Project – Monroe County, MO; Lake of the Ozarks – Miller County, MO

## **Thursday, 18 February 2010**

Wappapello Lake Project – Wayne County, MO; Reelfoot National Wildlife Refuge – Obion County, TN

## **Friday, 19 February 2010**

Cow Shoals Riverfront Forest Natural Area – Cleburne County, AR; Saline River – Saline County, AR

## **Saturday, 20 February 2010**

Hatchie National Wildlife Refuge – Haywood County, TN; Private property – Rutherford County, TN

## **Sunday, 21 February 2010**

Barnett's Woods – Montgomery County, TN; Clifty Gorge – Todd County, KY; Alum Hill – Grayson County, KY

## **Monday, 22 February 2010**

Yellowbank Wildlife Management Area – Breckinridge County, KY; LaRue-Pine Hills Research Natural Area – Union County, IL

## **Tuesday, 23 February 2010**

Deans Hills State Nature Preserve – Fayette County, IL

## **Wednesday, 24 February 2010**

Marshall State Fish and Wildlife Area – Marshall County, IL; Port Louisa National Wildlife Refuge – Louisa County, IA

# Collection Trip Daily Log

## Wednesday, 17 February 2010

Exploration at Mark Twain Lake Project identified numerous reproductive individuals throughout limestone bluffs located on the south side of Mark Twain Lake. Additional specimens were also noted at lower elevations near lake fingers. A large group of non-fruiting, most likely male specimens were noted. We sampled 6 trees, stretching across 2 miles.

Our next stop at Lake of the Ozarks found us searching along Swinging Bridges Road. This area was targeted due to historical herbarium specimen records. Unfortunately, only one tree was found. Further exploration resulted in finding multiple trees along the Grand Auglaize Creek Watershed. Of these, we sampled five, stretching across one mile. While sampling, numerous Kentucky coffeetree pods were noted with chewing marks from an animal with a nearby softball sized burrow. It was also interesting to note the turquoise – green colored water of Grand Auglaize Creek.



Chewing marks on pods – Lake of the Ozarks

## Thursday, 18 February 2010

Collecting at Lake Wappapello was completed with help from U.S. Army Corps of Engineers Park Ranger, Jeremy Jackson. The Lake Project is made up of 45,000 acres located in the foothills of the Ozark Mountains along the St. Francis River. Jeremy was able to flag fruiting Kentucky Coffeetrees for us before arrival. In addition, transportation via all terrain vehicle was provided and greatly assisted us in obtaining seeds from 4 specimens across a 7 mile stretch within a short period of time. One specimen that was sampled did not seem entirely healthy due to bark separating on lower limbs. Surprisingly, pods harvested from a fifth specimen, were all devoid of seeds.

# Collection Trip Daily Log

## Thursday, 18 February 2010 (cont'd)

After crossing the Mississippi River on the Dorena-Hickmann Ferry we found approximately 10 different patches of Kentucky Coffeetree along the northwest and west-facing bluffs near Walnut Log, TN. Numerous specimens were approximately 120' tall, which prevented us from harvesting them. Therefore, we sampled from two smaller trees. This area was very weedy in response to severe tree breakage from a prior-year ice storm. Interestingly, all coffeetrees were void of branch breakage.

## Friday, 19 February 2010

Our first site for the day at Cow Shoals Riverfront Forest Natural Area was very exciting. Due to large amounts of recent rainfall, the current and depth of the Little Red River did not allow us to wade across to harvest from trees located on the west banks. Therefore, we rented a boat guided by a local fishing outfitter, who was quite surprised at our request to taxi us to Cow Shoals to harvest Kentucky Coffeetree seeds. We were able to harvest from 4 trees. Thanks to Theo Witzell from the Arkansas National Heritage Commission who informed us about this native population.



Our next stop took us farther south near Little Rock, AR. Again, this population was brought to our attention by Theo Witzell. Initially we found 3 non-fruiting specimens (possibly male or juvenile) exactly where Theo had indicated. Further exploration allowed us to identify one fairly large (80-90') fruiting specimen, which was harvested. This specimen was growing in very rich bottomland soils, quite different from the other soils in the area.

## Saturday, 20 February 2010

Our first visit scheduled for Hatchie National Wildlife Refuge was abbreviated due to the type of habitat we found. From the extremely saturated soils and presence of strongly acid-loving plant species, it was clear that *Gymnocladus* would not be likely in this area.



# Collection Trip Daily Log

## **Saturday, 20 February 2010 (cont'd)**

Exploration resumed at a location along Short Creek in Rutherford County, TN. Unfortunately only one specimen was found bearing very few pods. It was decided to not add this accession into the NPGS, but to harvest a few seeds for the Brenton Arboretum's collection.

Before heading to our hotel in Clarksville, we decided to check out areas between Franklin and Murfreesboro. After driving from Hatchie National Wildlife Refuge to Short Creek it was obvious that Kentucky Coffeetree is not present throughout much of central Tennessee. However, we were able to find 3 specimens growing along Burke Hollow Road just east of Franklin, TN. Although we were able to harvest from each tree, only small quantities of pods were harvested.

## **Sunday, 21 February 2010**

Our first site for the morning was located at Barnett's Woods near Clarksville, TN. This site was selected based on historical herbarium records. Only 2 trees were found near one of the caves. Both had no fruits.

Our next site in Todd County, KY was recommended by Tara Littlefield with the Kentucky State Nature Preserves Commission. We spent a couple hours searching this area for Kentucky Coffeetree and only found two fairly large (60-70' tall), non-fruiting specimens.

The final site for the day located in Grayson County, KY was very successful. Tara Littlefield also informed us of this population growing on Alum Hill. We were able to find numerous patches of coffeetree throughout the bluffs, base of bluffs, and floodplain. We sampled 8 trees, with heavy seed production and excellent quality. Numerous trees were reaching 120' tall. Surprisingly, specimens in the bottomlands were only noted along a tributary into Rough River (Big Slough Creek), but not along Rough River itself.

# Collection Trip Daily Log

## Monday, 22 February 2010

Exploration at Yellowbank Wildlife Management Area was not needed as a result of reconnaissance work completed by Ryan Taylor and Larry Severs (Kentucky Department of Fish and Wildlife Resources). Interestingly, we noted *Fraxinus quadrangulata* seedlings growing on some bluffs (most likely limestone). We harvested from 4 trees. Ryan indicated that the area we collected from is generally 5 degrees Fahrenheit cooler than the surrounding area; Kentucky Coffeetrees seemed to be adapted to such cooler temperatures as their presence seemed to be restricted to this area.

Before making it to LaRue-Pine Hills area, three specimens of *Gymnocladus* were harvested along the Ohio River Watershed in Union County, KY, just before crossing into Illinois. An extremely large *Morus alba* was noted as an associate species.

Our final destination was at LaRue-Pine Hills Research Area just south of Carbondale, IL. Unfortunately, this area was severely damaged by high winds resulting in numerous trees laying down. Therefore, we spent some time scanning nearby areas for coffeetree. No specimens were noted. As daylight diminished, it was decided to change our hotel reservations, stay in Carbondale for the night, and resume exploration in the LaRue-Pine Hills area the following morning.

## Tuesday, 23 February 2010

After spending a large portion of the morning looking for hanging pods in trees, only one specimen growing on a east-facing slope at Fountain Buff was found. Fountain Bluff borders the Mississippi River and is located approximately 5 miles northwest of the LaRue-Pine Hills Research area. Again, due to the low quantity of pods, this accession was not added into the NPGS system, but was collected for the Brenton Arboretum collection. Before leaving this area, a substantial population of *Hydrangea arborescens* was noted and 15 plants subsequently harvested.

# Collection Trip Daily Log

## **Tuesday, 23 February 2010 (cont'd)**

Our last site for the day was located at Deans Hills Nature Preserve near Ramsey, IL. We easily found numerous coffeetrees located just outside of Deans Hills mostly on east-facing bluffs along Fayette County Road 2 and also along County Road 2800 N and 1600 E. We sampled 4 trees and then decided to spend the night in Peoria, IL.

## **Wednesday, 24 February 2010**

Driving along IL highway 26 towards Marshall State Fish and Wildlife Area, we noted numerous coffeetrees growing along west-facing bluffs. Approximately 200+ fruiting specimens were noted and 5 were sampled. Most were located within the bluffs or at the base of bluffs. It was interesting to note a couple specimens with very short (<2") pods.



Our last site was to target Port Louisa National Wildlife Refuge in Iowa. We briefly stopped at one location where local reconnaissance documented numerous specimens within a given area. Due to the time needed to walk to these specimens and depth of snow, we decided to explore the mouth of the Iowa River. At first it looked as if we had found one specimen growing in the floodplain of the Iowa River shortly before it joins the Mississippi River. Eventually we realized that the whole area was dominated by coffeetree and silver maple. It was interesting to note healthy, open grown coffeetrees, compared to other species that seemed to be struggling in this anaerobic site. We were quite happy to sample 7 trees along the Iowa River as opposed to the Mississippi River due to a population from Allamakee County along the Mississippi River already represented in the NPGS collection.

# Trip Summary

In total, we obtained 15 *Gymnocladus* accessions (60 mother trees sampled) and one *Hydrangea arborescens* accession. Please note that only 13 accessions with sufficient seed quantities were added into the NPGS. A total of 278 pounds of pods were collected resulting in 11,276 seeds. On average, 187 seeds were harvested per mother tree (range: 12-420 seeds).



This collection trip provided an opportunity to obtain *Gymnocladus dioicus* germplasm from numerous populations throughout its southern range. In addition, we were able to gain a sense for habitat preferences, commonalities in plant associates across collection sites, and the overall frequency and density of this species in nature.

Although Kentucky Coffeetree currently has few insect or disease problems, it makes up a very small proportion of the forest canopy. The presence of invasive species and shade intolerance of coffeetree makes regeneration less likely. Noting this species only growing on north and/or northeast-facing slopes in southern Missouri and Arkansas could possibly suggest that this species is not very heat tolerant. The frequency of *Gymnocladus* from central Missouri and south was typically less than 0.5%, which concurred with information obtained from local contacts. In contrast, large populations (200+) of *Gymnocladus* were noted along the west-facing bluffs along the Illinois River watershed in Marshall County, IL and near the mouth of the Iowa River watershed in Louisa County, IA.

# Trip Summary

Specimens were typically growing on limestone bluffs, at the base of bluffs, and also in rich, bottomland soils. Typical plant associates included *Fraxinus quadrangulata* (only on limestone bluffs), *Celtis occidentalis*, *Platanus occidentalis*, *Asimina triloba*, *Arundinaria gigantea*, *Fraxinus pennsylvanica*, and *Symphoricarpos orbiculatus*. Less common species encountered included *Aesculus glabra* and *Lindera benzoin*. Invasive species commonly encountered included *Smilax rotundifolia*, *Rosa multiflora*, *Pueraria montana* var. *lobata*, and *Lonicera japonica*.

Throughout the collection trip, very few juvenile specimens were found. Prehistorically, *Gymnocladus* relied on large, mammalian herbivores to disperse the relatively large (1-2 cm diameter), rock-hard seeds. Due to its slightly toxic properties to smaller animals and size of seeds, it is unknown if there are any remaining living creatures that currently act as an effective dispersal mechanism. In addition, there is little information documenting pollinators that visit *Gymnocladus* flowers. It would be interesting to note what pollinators pollinate *Gymnocladus* and possibly how far those pollinators travel. For a species that may not be regenerating well in nature, it may depend on a pollinator that can travel long distances in order to ensure cross-pollination. During collection we documented a few mother trees, where the pods were completely empty (e.g. Wayne County, MO and Fayette County, IL) or very small (less than 2" in length (e.g. Marshall County, IL)). In contrast, occasional observations noted single mother trees sporting pods in the absence (less than 1 square mile) of a staminate specimen. This observation would question whether this species is truly dioecious. Future research needs to be conducted to verify these speculations.

Since Kentucky coffeetree is considered clonal by nature and forms small colonies from root suckers, care was taken to ensure sampling from genetically different trees. A stratified sampling technique was executed by collecting seeds from trees of differing age classes, morphology, and distance. The average distance between sampled mother trees was 1,108m (range: 20-7079m), which helps reduce the likelihood of sampling siblings or reproductive root suckers.

# List of Germplasm Collected

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Collection Number: JDC/GD/2010/001/271  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 17 February 2010  
County, State: MONROE COUNTY, MISSOURI  
Elevation: 199m  
Latitude: 39.4927°N  
Longitude: 91.7651°W (NAD83)  
Locality: Mark Twain Lake – Mark Twain Lake Project - northwest-facing limestone bluffs; woods  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Aesculus glabra*, *Carya cordiformis*, *C. ovata*, *Celtis occidentalis*, *Fraxinus quadrangulata*, *Juglans nigra*, *Prunus serotina*, *Quercus imbricaria*, *Rhus* sp., *Ribes* sp., *Sassafras albidum*, *Symphoricarpos orbiculatus*, and *Zanthoxylum americanum*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2010/002/272  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 17 February 2010  
County, State: MILLER COUNTY, MISSOURI  
Elevation: 207m  
Latitude: 38.073867°N  
Longitude: 92.526867°W (NAD83)  
Locality: Grand Auglaize River Watershed – Lake of the Ozarks – bottomlands  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Acer negundo*, *Aesculus glabra*, *Celtis occidentalis*, *Platanus occidentalis*, *Quercus macrocarpa*, *Rosa multiflora*, *Ulmus* sp., and *Smilax rotundifolia*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2010/003/273  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 18 February 2010  
County, State: WAYNE COUNTY, MISSOURI  
Elevation: 127m  
Latitude: 37.1822°N  
Longitude: 90.4937°W (NAD83)  
Locality: St. Francis River Watershed - Lake Wappapello Project - bottomlands  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Arundinaria gigantea*, *Celtis* sp., *Fraxinus pennsylvanica*, *Gleditsia triacanthos*, *Platanus occidentalis*, and *Smilax rotundifolia*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens, Andrew P. Schmitz, and Jeremy Jackson

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Collection Number: JDC/GD/2010/004/274  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 18 February 2010  
County, State: OBION COUNTY, TENNESSEE  
Elevation: 93m  
Latitude: 36.474983°N  
Longitude: 89.30245°W (NAD83)  
Locality: Walnut Log, TN – base of northwest-facing and west-facing bluffs  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Acer negundo*, *Arundinaria gigantea*, *Campsis radicans*, *Liriodendron tulipifera*, *Platanus occidentalis*, *Quercus* sp., *Paulownia tomentosa*, *Pueraria montana* var. *lobata*, *Smilax rotundifolia*, and *Toxicodendron radicans*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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# List of Germplasm Collected

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Collection Number: JDC/GD/2010/005/275  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 19 February 2010  
County, State: SALINE COUNTY, ARKANSAS  
Elevation: 153m  
Latitude: 34.688233°N  
Longitude: 92.844317°W (NAD83)  
Locality: Alum Fork Saline River Watershed – bottomlands  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Arundinaria gigantea*, *Carya* sp., *Celtis* sp., *Hamamelis vernalis*, and *Liquidambar styraciflua*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2010/006/276  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 19 February 2010  
County, State: CLEBURNE COUNTY, ARKANSAS  
Elevation: 87m  
Latitude: 35.5135°N  
Longitude: 91.928967°W (NAD83)  
Locality: Little Red River Watershed – Cow Shoals Riverfront Forest Natural Area – bottomlands  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Arundinaria gigantea*, *Betula nigra*, *Campsis radicans*, *Celtis* sp., *Liquidambar styraciflua*, *Lonicera japonica*, *Platanus occidentalis*, *Rosa multiflora*, and *Toxicodendron radicans*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: APS/GD/2010/007/042 – not assigned to NPGS  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 20 February 2010  
County, State: RUTHERFORD COUNTY, TENNESSEE  
Elevation: 282m  
Latitude: 35.65192°N  
Longitude: 86.35929°W (NAD83)  
Locality: Short Creek Watershed – rock substrate  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Lindera benzoin*, *Symphoricarpos orbiculatus*, *Juniperus virginiana*, *Vitis riparia*, *Aesculus glabra*, and *Quercus* spp.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2010/007/277  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 20 February 2010  
County, State: WILLIAMSON COUNTY, TENNESSEE  
Elevation: 316m  
Latitude: 35.912783°N  
Longitude: 86.6981°W (NAD83)  
Locality: Burke Hollow Road – Franklin, TN – bluffs  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Celtis* sp., *Diospyros virginiana*, *Fagus sylvatica*, *Juniperus virginiana*, *Symphoricarpos orbiculatus*, and *Vitis riparia*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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# List of Germplasm Collected

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Collection Number: JDC/GD/2010/008/278  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 21 February 2010  
County, State: GRAYSON COUNTY, KENTUCKY  
Elevation: 159m  
Latitude: 37.536°N  
Longitude: 86.5963°W (NAD83)  
Locality: Alum Hill and Big Slough River Watershed – Hites Falls, KY – bluffs and bottomlands  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Acer negundo*, *Aesculus glabra*, *Asimina triloba*, *Celtis occidentalis*, *Fagus sylvatica*, *Fraxinus pennsylvanica*, *Juglans nigra*, *Lindera benzoin*, *Platanus occidentalis*, *Quercus* sp., *Toxicodendron radicans*, and *Vitis riparia*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2009/009/279  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 22 February 2010  
County, State: BRECKINRIDGE COUNTY, KENTUCKY  
Elevation: 130m  
Latitude: 37.9606°N  
Longitude: 86.4988°W (NAD83)  
Locality: Yellowbank Wildlife Management Area – bluffs and bottomlands  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Acer saccharum*, *Aesculus glabra*, *Arundinaria gigantea*, *Asimina triloba*, *Carya cordiformis*, *Diospyros virginiana*, *Fagus sylvatica*, *Fraxinus americana*, *F. quadrangulata*, *Lindera benzoin*, *Liriodendron tulipifera*, *Lonicera japonica*, *Paulownia tomentosa*, *Platanus occidentalis*, *Quercus* sp., *Rhus* sp., *Ulmus* sp., and *Vitis riparia*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens, Andrew P. Schmitz, Ryan Taylor, and Larry Severs.

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Collection Number: JDC/GD/2010/010/280  
Scientific Name: *Gymnocladus dioicus* (L.) K. Koch  
Date: 22 February 2010  
County, State: UNION COUNTY, KENTUCKY  
Elevation: 141m  
Latitude: 37.736983°N  
Longitude: 88.045917°W (NAD83)  
Locality: Ohio River Watershed – bottomlands and base of northeast-facing bluffs  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Acer saccharinum*, *Celtis* sp., *Maclura pomifera*, *Morus alba*, and *Sambucus canadensis*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/HA/2010/011/281  
Scientific Name: *Hydrangea arborescens* L.  
Date: 23 February 2010  
County, State: JACKSON COUNTY, ILLINOIS  
Elevation: 129m  
Latitude: 37.6916°N  
Longitude: 89.4752°W (NAD83)  
Locality: Fountain Bluff – east-facing slope  
Herbarium Specimen: no, however scanned images of pods were captured.  
Plant associates: Associated with *Gymnocladus dioicus*, *Celtis* sp., *Acer saccharum*, *Aesculus glabra*, *Fraxinus* sp., *Quercus* sp., and *Platanus occidentalis*.  
Biomass Type (seed, plant, cutting, herbarium specimen): SD  
Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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# List of Germplasm Collected

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Collection Number: APS/GD/2010/012/047 – not assigned to NPGS

Scientific Name: *Gymnocladus dioicus* (L.) K. Koch

Date: 23 February 2010

County, State: JACKSON COUNTY, ILLINOIS

Elevation: 129m

Latitude: 37.6916°N

Longitude: 89.4752°W (NAD83)

Locality: Fountain Bluff – east-facing bluff

Herbarium Specimen: no, however scanned images of pods were captured.

Plant associates: Associated with *Hydrangea arborescens*, *Celtis* sp., *Acer saccharum*, *Aesculus glabra*, *Fraxinus* sp., *Quercus* sp., and *Platanus occidentalis*.

Biomass Type (seed, plant, cutting, herbarium specimen): SD

Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2010/012/282

Scientific Name: *Gymnocladus dioicus* (L.) K. Koch

Date: 23 September 2009

County, State: FAYETTE COUNTY, ILLINOIS

Elevation: 172m

Latitude: 39.1397°N

Longitude: 88.9749°W (NAD83)

Locality: Kaskaskia River and Becks Creek Watersheds – bluffs and base of bluffs

Herbarium Specimen: no, however scanned images of pods were captured.

Plant associates: Associated with *Acer saccharum*, *Asimina triloba*, *Carya* sp., *Celtis* sp., *Cornus* sp., *Juglans nigra*, *Platanus occidentalis*, *Prunus americana*, *P. serotina*, *Quercus* sp., *Sassafras albidum*, *Staphylea trifolia*, *Tilia americana*, and *Vitis riparia*.  
Noted *Catalpa* sp. and *Corylus americana* along roadside on west edge of Deans Hills.

Biomass Type (seed, plant, cutting, herbarium specimen): SD

Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2010/013/283

Scientific Name: *Gymnocladus dioicus* (L.) K. Koch

Date: 24 September 2009

County, State: MARSHALL COUNTY, ILLINOIS

Elevation: 158m

Latitude: 40.9282°N

Longitude: 89.4269°W (NAD83)

Locality: Marshall State Fish and Wildlife Area – bluffs and base of bluffs

Herbarium Specimen: no, however scanned images of pods were captured.

Plant Associates: Associated with *Acer saccharum*, *Carya cordiformis*, *Celtis* sp., *Juglans nigra*, *Lonicera tatarica*, *Quercus* sp., *Ribes* sp., *Robinia pseudoacacia*, *Rubus* sp., and *Staphylea trifolia*.

Biomass Type (seed, plant, cutting, herbarium specimen): SD

Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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Collection Number: JDC/GD/2010/014/284

Scientific Name: *Gymnocladus dioicus* (L.) K. Koch

Date: 24 September 2009

County, State: LOUISA COUNTY, IOWA

Elevation: 170m

Latitude: 41.154167°N

Longitude: 91.041533°W (NAD83)

Locality: Mouth of Iowa River – bottomlands and base east-facing bluffs

Herbarium Specimen: no, however scanned images of pods were captured.

Plant Associates: Associated with *Acer saccharinum*, *Carya cordiformis*, *Celtis occidentalis*, *Fraxinus pennsylvanica*, *Populus deltoides*, and *Vitis riparia*.

Biomass Type (seed, plant, cutting, herbarium specimen): SD

Collectors: Jeffrey D. Carstens and Andrew P. Schmitz

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# Alphabetical List of Germplasm Collected

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<b><u>Taxonomy</u></b>	<b><u>Collection #</u></b>	<b><u>Locality</u></b>
<i>Gymnocladus dioicus</i>	Ames 30481	Monroe County, Missouri
<i>Gymnocladus dioicus</i>	Ames 30482	Miller County, Missouri
<i>Gymnocladus dioicus</i>	Ames 30483	Wayne County, Missouri
<i>Gymnocladus dioicus</i>	Ames 30485	Saline County, Arkansas
<i>Gymnocladus dioicus</i>	Ames 30486	Cleburne County, Arkansas
<i>Gymnocladus dioicus</i>	Ames 30484	Obion County, Tennessee
<i>Gymnocladus dioicus</i>	APS/GD/2010/007/042	Rutherford County, Tennessee
<i>Gymnocladus dioicus</i>	Ames 30487	Williamson County, Tennessee
<i>Gymnocladus dioicus</i>	Ames 30488	Grayson County, Kentucky
<i>Gymnocladus dioicus</i>	Ames 30489	Breckinridge County, Kentucky
<i>Gymnocladus dioicus</i>	Ames 30490	Union County, Kentucky
<i>Gymnocladus dioicus</i>	APS/GD/2010/012/047	Jackson County, Illinois
<i>Gymnocladus dioicus</i>	Ames 30491	Fayette County, Illinois
<i>Gymnocladus dioicus</i>	Ames 30492	Marshall County, Illinois
<i>Gymnocladus dioicus</i>	Ames 30493	Louisa County, Iowa
<i>Hydrangea arborescens</i>	Ames 30494	Jackson County, Illinois