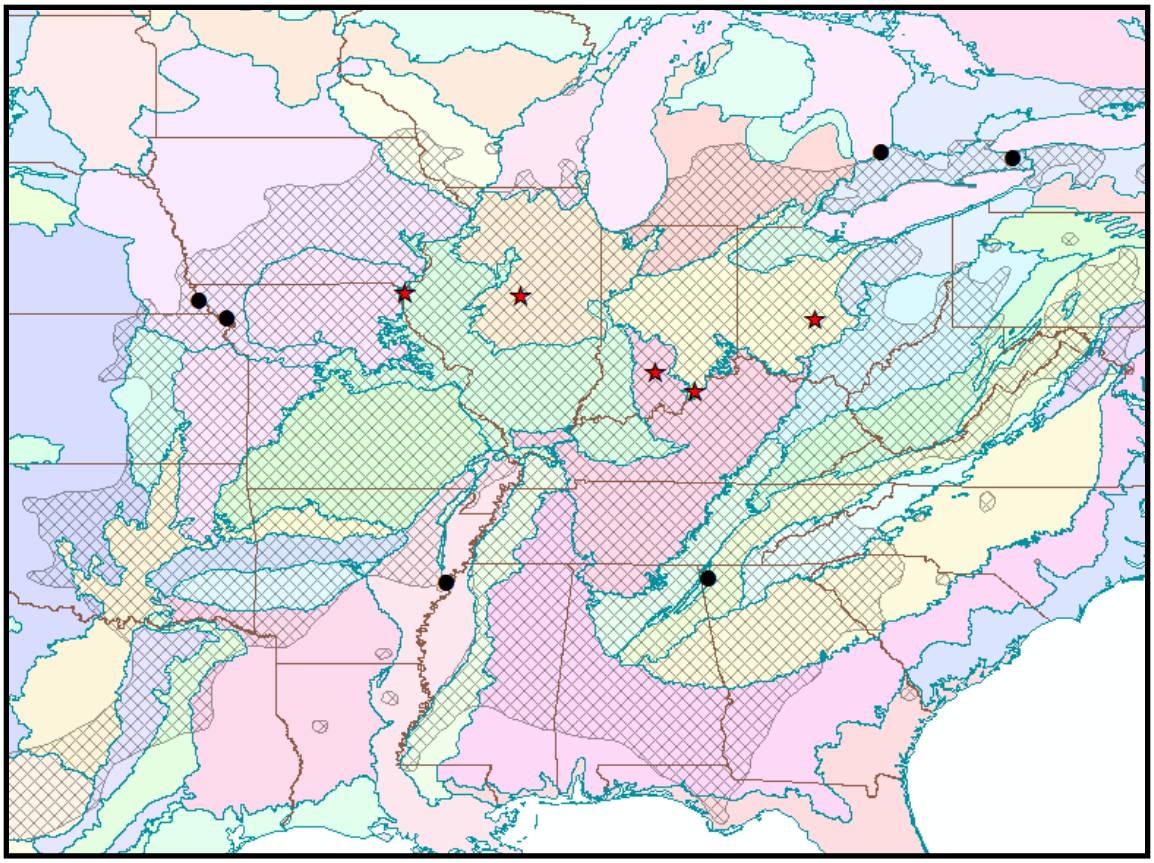
2012 Collection Trip

Quercus muehlenbergii

USDA United States Department of Agriculture

September 13-14, 2012

NPGS *Quercus muehlenbergii* Sites



● Past accessions

★ 2012 accessions

Cover: Image of *Quercus muehlenbergii* taken at collection site of NA 81140 on September 14, 2012.

TABLE OF CONTENTS

Introduction

The USDA-ARS Plant Introduction Station (Ames, IA) completed a collection trip targeting four sites containing *Quercus muehlenbergii*. 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)
- **Irvin D. Larsen**, Agricultural Science Research Technician, USDA-ARS Plant Introduction Station, Ames, IA (right)

Objectives:

- Collect *Quercus muehlenbergii* populations and potentially other NPGS genera in Iowa, Illinois, and Indiana during 2012.
- Ultimately conserve and preserve genetic diversity of *Quercus muehlenbergii* germplasm

Collection Trip Plan

Thursday, 13 September 2012
Keokuk, Iowa – Lee County, IA
Funks Grove – McLean County, IL

Friday, 14 September 2012
Bedford, Indiana – Lawrence County, IN
Charlestown State Park – Clark County, IN

Collection Trip Daily Log

Thursday, 13 September 2012

Previous exploration during the 2012 *Fraxinus quadrangulata* collecting trip identified numerous, fruiting chinkapin oaks (*Q. muehlenbergii*) along Twin Rivers Drive southwest of Keokuk, Iowa (Fig 1.). Specimens were growing on both south and southwest-facing slopes growing in association with *Asimina triloba, Cornus racemosa, Cercis canadensis,* and *Quercus macrocarpa.* All specimens ranged between 16-22" d.b.h. and approximately 60-80' tall. Leaf quality was relatively poor, most likely due to extreme drought and spider mites. A few acorns were starting to drop, but majority of the acorns were turning green to yellow. Shaking of branches did not serve as an efficient technique for harvesting as acorns were still quite "attached" to the caps. Pruning of small branches (1" diameter) would equate to approximately 20-30 acorns. A total of five specimens were harvested along the railroad (half mile stretch). It was interesting to find one *Carya laciniosa* (easy to confirm due to presence of fruits) in a nearby drainage ditch.

Fig. 1 South-facing slope displaying numerous *Q. muehlenbergii* (Lee County, Iowa).

Collection Trip Daily Log

Thursday, 13 September 2012 (cont'd)

Funks Grove is an amazing old growth forest surrounded by row crop agriculture on relatively flat terrain and deep soils. A couple of the chinkapin oak specimens were of enormous size ranging from 5-6' d.b.h. and close to 100' tall (Fig. 2.). Surprisingly, a number of chinkapin oaks had already finished dropping acorns, but luckily we were able to harvest from two very old specimens along a drainage ditch just north of the Sugar Grove Nature Center. Foliage quality was excellent and acorn production was abundant. Associated species included *Acer saccharum, Juglans nigra, Quercus rubra,* and *Quercus macrocarpa.* One specimen found near 40.348967, -89.134509 had very large acorns (Fig. 3.) and leaves that were very wide possibly representing a hybrid (similar shape/outline as *Q. macrocarpa* with typical serration of *Q. muehlenbergii*). It was interesting to still note a number of *Fraxinus quadrangulata* still bearing seeds which were fully mature the first week in July.

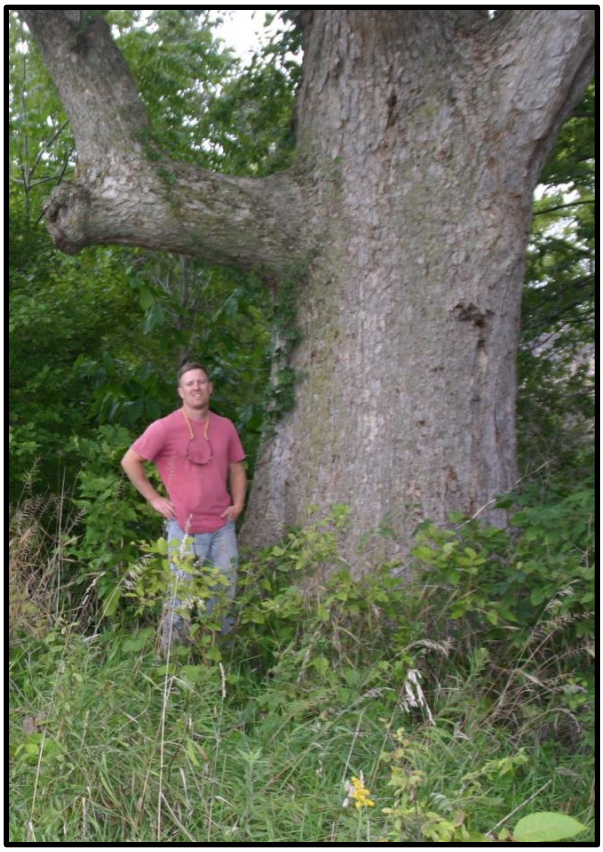


Fig. 2 Large specimen that was harvested at Funks Grove (McLean County, Illinois).
Fig. 3 Image of acorns from proposed hybrid growing at Funks Grove (McLean County, Illinois).

Collection Trip Daily Log

Friday, 14 September 2012

A number of chinkapin oaks can be found southeast of Bedford, Indiana along Tunnelton Road. This area has a number of rolling hills commonly used as pasture or woods. Specimens at this site were similar in size compared to those found at Funks Grove. A total of three specimens were harvested averaging 500 yards apart from each other. Acorn production was abundant and it was interesting to note variation in maturity of all three specimens sampled (Fig. 4). Foliage quality was excellent. Associated species included *Asimina triloba, Gleditisa triacanthos, Quercus alba, Ulmus rubra,* and *Rosa multiflora.*

Fig. 4 Variation across three specimens harvested near Bedford, Indiana (from left to right – specimen .01, .02, and .03 – quarter included for size comparison).

Collection Trip Daily Log

Friday, 14 September 2012 (cont'd)

Charlestown State Park contains a large number of *Q. muehlenbergii* and its close associate *Fraxinus quadrangulata*. The habitat is a characteristic glade (Fig. 5) containing a number of *Dodecatheon meadia* and *Blephilia ciliata.* Acorns on the chinkapin oaks were mostly green, which was expected considering this population was the farthest south. A total of five specimens were sampled. An interpretive naturalist, Jeremy Beavin, showed us a number of interesting corals that date back to the Devonion Period, approximately 360 to 410 million years ago during the Palezoic Era. Two of the more common corals found on the glade included rugose coral *Prismatophyllum* and tabulate corals, *Favosites,* commonly called "honeycomb coral". We were fortunate to have two local botanists, Richard B. Lyons and William E. Thomas, direct to us to some of the larger *Q. muehlenbergii* and also a number of fruiting *Gymnocladus dioicus,* noted along Trailhead #5. Their assistance was greatly appreciated.

Fig. 5 Glade habitat with a specimen of *Q. muehlenbergii* located in Charlestown State Park (Clark County, Indiana).

Trip Summary

All four sites targeted resulted in the successful acquisition of *Quercus muehlenbergii* germplasm. These four collections represent significant gaps in the current NPGS collection. In addition, germplasm from two additional populations (Missouri and Ohio) were obtained via coordination with local, expert horticulturists.

Aside from collecting *Q. muehlenbergii,* one collection of *Viburnum prunifolium* was harvested near Kirksville, Missouri.

This trip provided an excellent opportunity to identify and collect *Q. muehlenbergii* from a very wide geographic range (350 miles – Lee County, IA to Clark County, IN) and from different habitats (e.g. NA 81138 - south-facing dry slopes with relatively shallow soils; NA 81139 - flat terrain with deep soils; NA 81140 – rolling hills with relatively deep soils, and NA 81141 – glade with very shallow soils). Common plant associates included *Quercus macrocarpa, Fraxinus quadrangulata,* and *Asimina triloba*.

Harvesting of *Q. muehlenbergii* could be considered an extreme challenge, considering once acorns start to mature, they drop within a very short period of time (e.g. approximately 7-10 days). Since chinkapin oak acorns have a low tannin content, they are highly palatable to a plethora of animals. So, not only do the acorns drop within a short window of time, they are quickly consumed after dropping. Communication with local botanists to accurately target peak harvesting dates was necessary, extremely helpful, and greatly appreciated.

Specimens harvested during this trip were obtained either by a shaking method, pruning of small exterior branches, hand-picking from low-hanging branches, and/or picking off the ground. Acorns that were still green or yellow did not easily disperse/fall with the shaking method. Timing of this trip targeted the optimum timing for harvesting the Keokuk, IA and Bedford, IN populations, while a number of specimens in Funks Grove were past maturity and few specimens in Charlestown State Park where still fairly green.

Trip Summary

In the areas we explored, the abundance of chinkapin oak in nature is quite variable. There are situations/sites where the species is the dominant species (e.g. typically found on shallow soils, high in limestone and usually south or west-facing slopes), but these situations/sites are rare, small in scale, and would be considered localized. In general, the chinkapin oak could be labeled as a relatively uncommon species throughout the majority of its native range, minus the occasional "hot spots" where the species is able to flourish and outcompete other taxa.

While being guided around Charlestown State Park by Richard B. Lyons, he mentioned an interesting story about how the chinkapin oak used to be historically referred to as "pigeon oak". According to this old folk tale, hunters would seek out specimens of *Q. muehlenbergii* during mast years knowing that they would be prime locations for harvesting passenger pigeons. After a great deal of searching on the internet and also reading portions of The Passenger Pigeon: Its Natural History and Extinction by A.W. Schorger, I was not able to find a reference indicating pigeon oak as a common name for *Q. muehlenbergii.* Schorger mentions that passenger pigeons fed on a number of *Quercus* spp. (mostly in the red oak group), inclduding *Q. phellos, Q. nigra, Q. velutina, Q. palustris, Q. marilandica,* and *Q. macrocarpa.* It was mentioned that the value of acorns in the "white oak group" is brief because the acorns soon sprout after falling. The preferred crops of the passenger pigeon included beech, oak, wheat, and buckwheat, but also a wide variety of other fruits. Known to have a "delayed digestive system" and occasionally disgorge and satiate itself with something else would aid in the dispersal of *Quercus* (.5 to 25 miles), especially for species with smaller sized acorns. Considering the random distribution and infrequent occurrence of this species in nature, plus the early sprouting nature of the acorns, it is not surprising to see this species not mentioned in Schorger's book or other references. From an evolutionary standpoint, it would interesting to know how different our forests would be today if the passenger pigeon was still alive.

Trip Summary

Coordination with Sean Clearly, Missouri Wildlife Management Biologist, resulted in the re-acquisition of PI 495614 (*Q. muehlenbergii* – Holt County, Missouri). At the time of harvest (20th September), Sean reported acorns as being “black” and “abundant”.

Coordination with Peter Zale, Ohio State PhD. candidate, resulted in the acquisition of *Q. muehlenbergii* (NA 81198) from Battelle Darby Creek Metro Park just southwest of Columbus, Ohio.

Material from these six populations of chinkapin oak will set the stage for an organized, long-term (10 year) evaluation study through the NC7 Regional Woody Ornamentals Trials Program. This will be an excellent opportunity to determine overall performance and adaptability across a wide variety of sites across the U.S. Each trial site will potentially be able identify a provenance that is superior in performance, which may lead to specific recommendations for local, horticulture professionals.

Initial observations at the North Central Regional Plant Introduction Station in Ames, Iowa have noted that five-year old specimens of *Q. muehlenbergii* (PI 495615 - Nemaha County, Nebraska) are reproductive and very vigorous with an average height of 15’ (sample size - 12 specimens). Considering chinkapin oak can be found in both very dry and relatively wet soils, its adaptability and performance in the urban landscape may potentially be very high.

Alphabetical List of Germplasm Collected

Taxonomy	Collection #	Locality
Quercus muehlenbergii	NA 81138	Lee County, IA
Quercus muehlenbergii	NA 81139	McLean County, IL
Quercus muehlenbergii	NA 81140	Lawrence County, IN
Quercus muehlenbergii	NA 81141	Clark County, IN
Viburnum prunifolium	Ames 31540	Adair County, MO

Alphabetical List of Germplasm Received

Taxonomy	Collection #	Locality
Quercus muehlenbergii	NA 81198	Franklin County, OH
Quercus muehlenbergii	PI 495614	Holt County, MO

Alphabetical List of Vouchers Collected

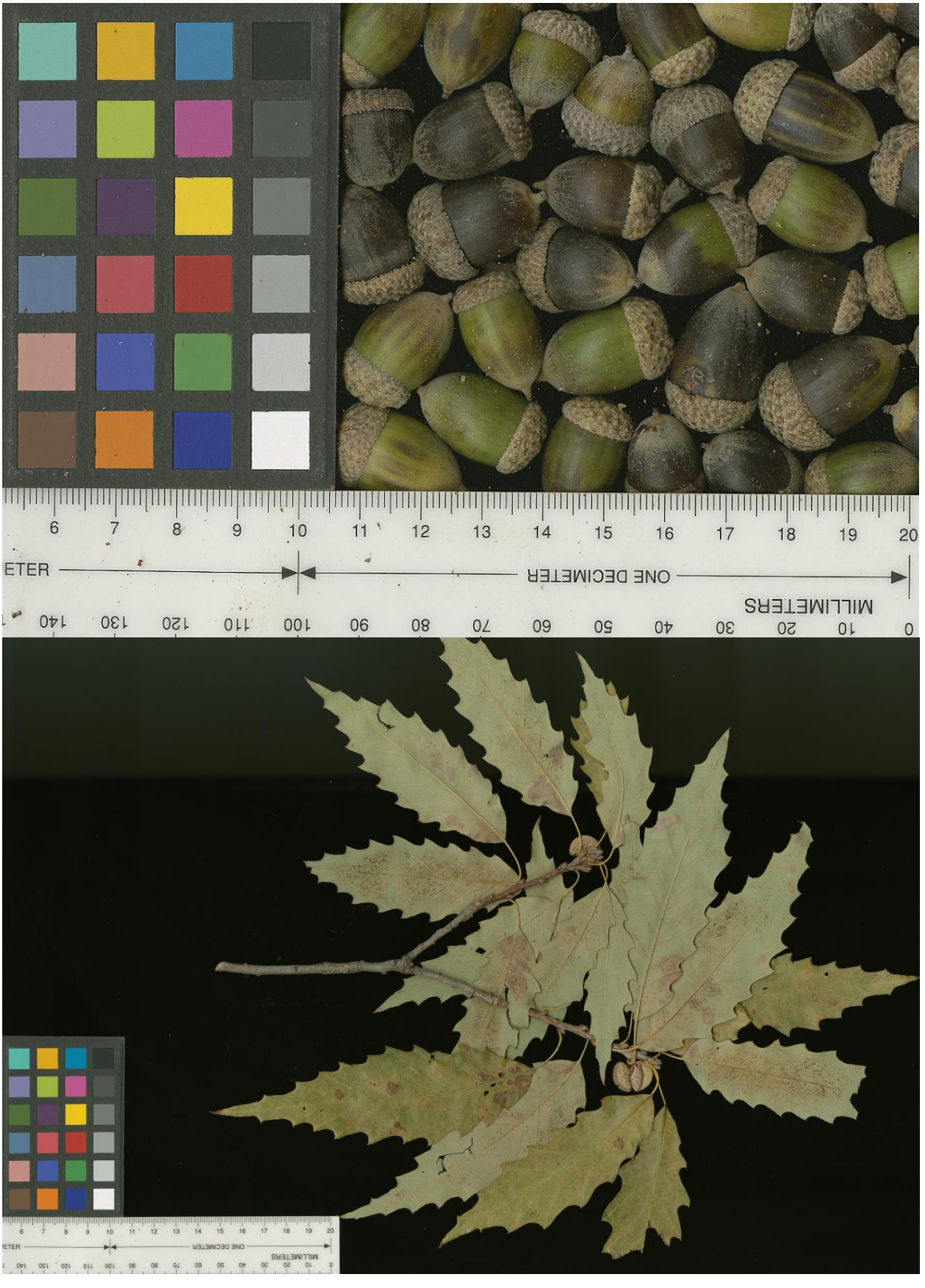
Taxonomy	Collection #	Locality
Quercus muehlenbergii	**JDC/QM/2012/045/438**	**Lee County, IA**
Quercus muehlenbergii	**JDC/QM/2012/046/439**	**McLean County, IL**
Quercus muehlenbergii	**JDC/QM/2012/047/440**	**Lawrence County, IN**
Quercus muehlenbergii	**JDC/QM/2012/048/441**	**Clark County, IN**
Viburnum prunifolium	**JDC/VP/2012/049/442**	**Adair County, MO**

Herbarium specimens were deposited at the National Arboretum, Indiana University Southeast, Morton Arboretum, and the Ada Hayden Herbarium.

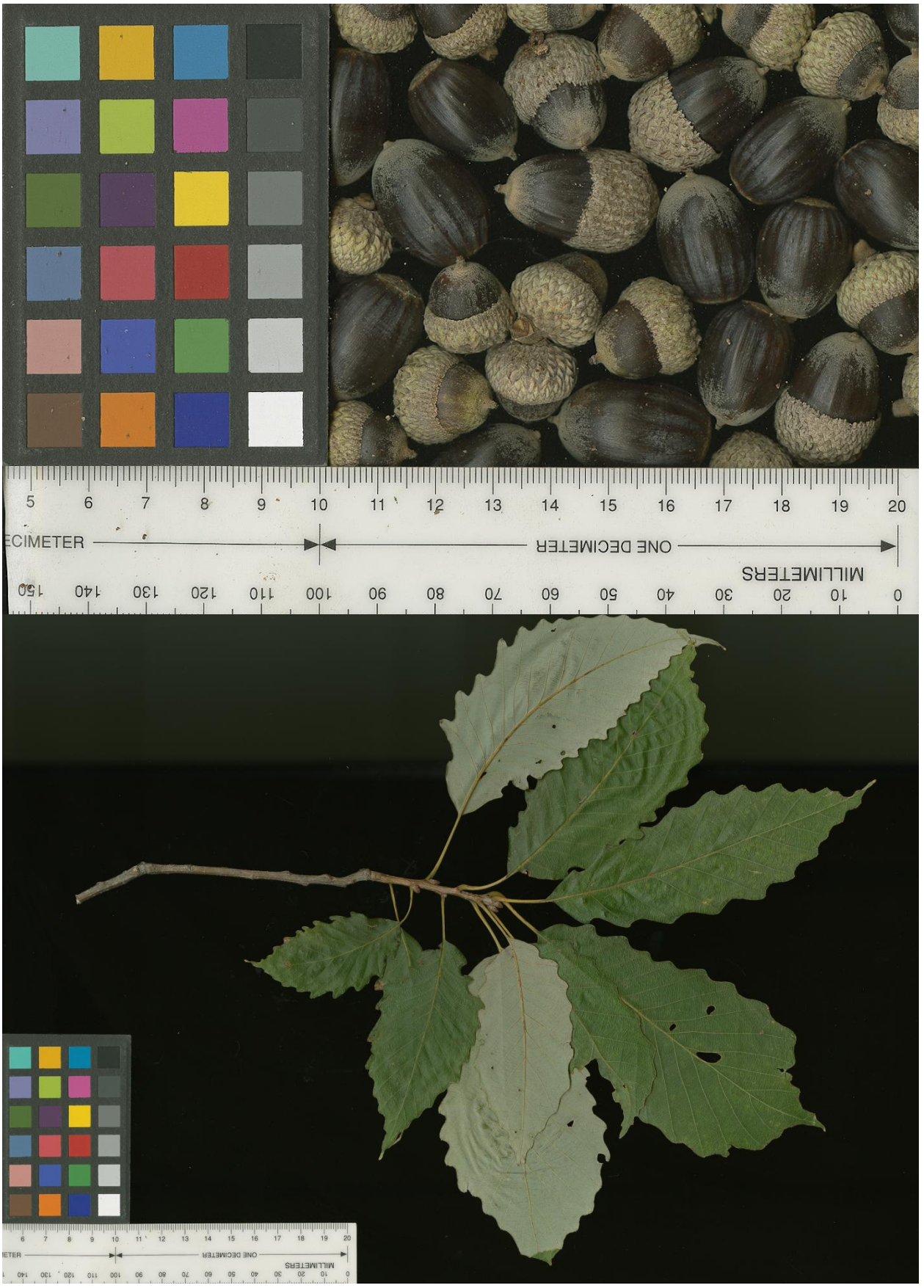
Acknowledgements

I would like to thank a number of individuals for their help and assistance in pinpointing peak harvest time for *Quercus muehlenbergii.* Their expertise and knowledge of local flora helped make this collection trip successful.

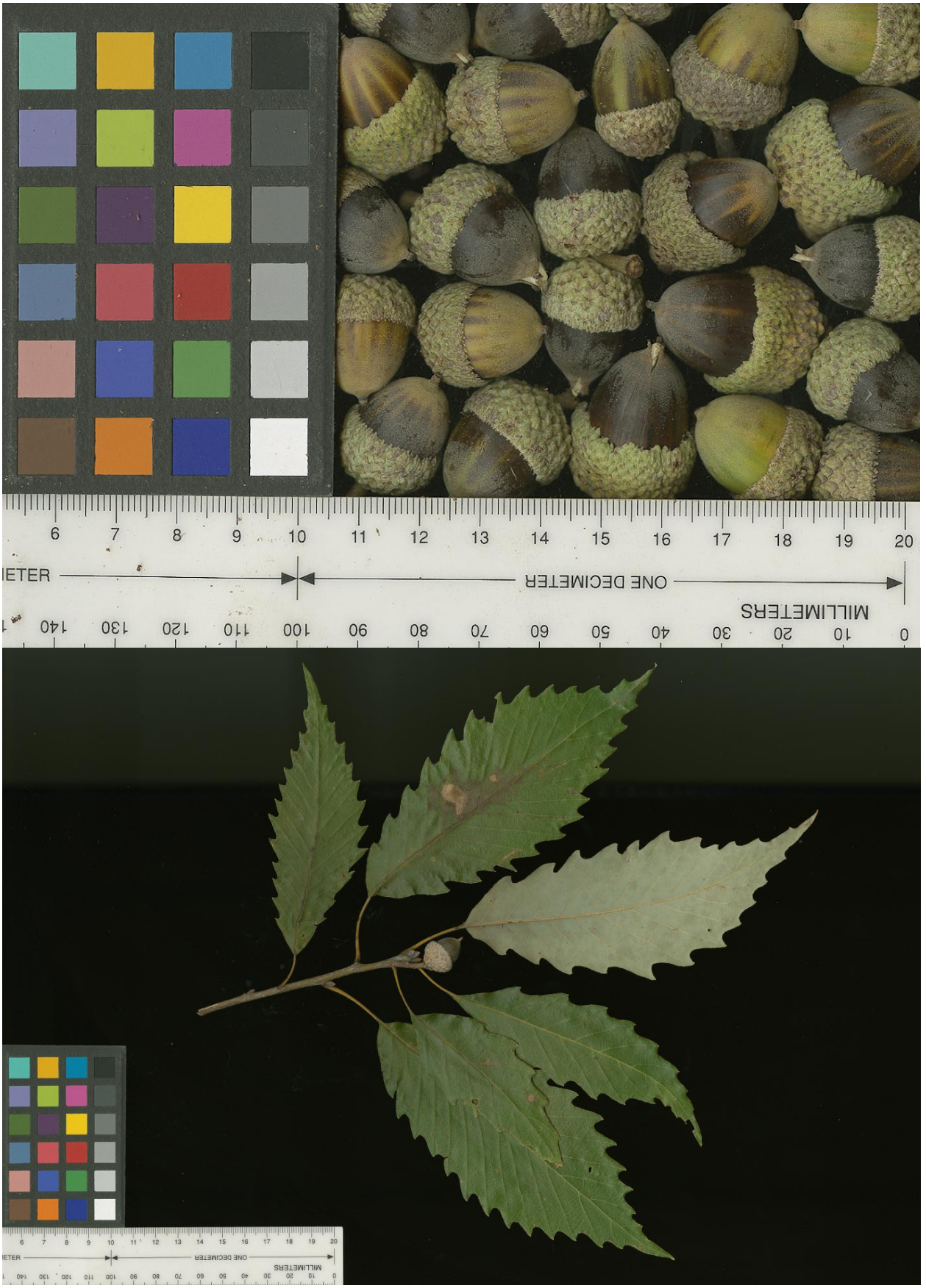
William E. Thomas – Indiana University Southeast
Jeremy Beavin – Indiana Department of Natural Resources
Richard B. Lyons – Naturalist
Randall Carriger – Sugar Grove Nature Center
Guy Sternberg – Starhill Forest Arboretum
Phil O'Connor – Indiana Division of Forestry
Scott Woodbury – Shaw Nature Reserve
Sally Weeks – Indiana Department of Forestry and Natural Resources
Sean Cleary – Missouri Department of Conservation
Peter Zale – Ohio State University
Pablo Jourdan – Ornamental Plant Germplasm Center
Rick Gardner – Ohio Department of Natural Resources



NA 81138 – Keokuk, Iowa



NA 81139 – McLean, Illinois



NA 81140 – Bedford, Indiana

NA 81141 – Charlestown, Indiana