

Is White Mulberry a threat to Red Mulberry on Konza?

By Madhav P. Nepal, Division of Biology and Kansas State University Herbarium

Introduced species have been known to negatively affect natural ecosystems in a number of ways: 1) They may compete with native species for resources; 2) grow better in absence of their natural enemies; 3) serve as the vectors for parasites/pathogens; 4) hybridize with native species, and 5) bring about the extinction of native species. White Mulberry (*Morus alba*), a native to China, was introduced during colonial times to establish a silkworm industry in the United States and it is used widely as an ornamental and fruit tree. It has escaped cultivation nearly everywhere and is successfully naturalized in forests and open areas throughout the country with the exception of Arizona and Nevada. The native species Red Mulberry (*Morus rubra*) is naturally distributed in eastern North America from the east coast to the eastern margin of the Great Plains. The Flint Hills region of Kansas is on the western fringe of the distribution of Red Mulberry, and here it occurs in isolated patches of woodlands.

Red Mulberry used to be more common in the dissected hills and lowlands west to Salina, but is now largely replaced by White Mulberry. Konza Prairie lies within a region where both species occur in mixed populations. While Red Mulberry is restricted to the stream terrace and mesic slope environments near the major streams, White Mulberry has become established on uplands and more moist lowland sites. In fact, the most of the mulberry we see in the Kansas landscape is White Mulberry; but this is not really the case on Konza. Whereas Red Mulberry can be found along the major creeks (Kings and Shane) and adjacent slopes, White Mulberry is more scattered, with populations along most of the more disturbed drainages, such as south of the headquarters and in lower Kings Creek. White Mulberry trees can also be found scattered in open habitats nearly throughout the prairie as scraggly small trees, these probably persisting from days of less frequent fire.

Because native Red Mulberry and introduced White Mulberry grow in mixed populations in places on Konza, and have common flowering and fruiting time, the question arises as to whether they may be undergoing hybridization and whether hybrid progeny may be more fit than either of the parents. If so, White Mulberry may pose a threat to its native congener Red Mulberry by hybridization, genetic "swamping", and ultimately perhaps competitive exclusion.

My research is trying to determine if White Mulberry and Red Mulberry are hybridizing on Konza, and seeks to determine the potential outcome of hybridization if it is indeed occurring. In order to do this, I marked the trees of both species, mapped them, and have been noting their life history characteristics particularly on their sex expression. DNA samples from these trees were collected and they are being assessed for hybridization using molecular markers called RAPDs (Randomly Amplified Polymorphic DNAs). These markers can distinguish the species and demonstrate if they have a presence of genetic exchange between them. A big part of this effort is determining the sexual expression of trees since this will play a big role in the potential for hybridization among species. Trees of both species are usually all males or females (dioecious) but they can exhibit various forms of monoecy in which male and female flowers occur on the same tree. Both species have male biased sex ratios. Proportionately 4 times more female trees are found in the White Mulberry populations than in Red Mulberry populations. This emphasis on female function indicates that White Mulberry can produce more offspring than the



Red Mulberry in flower (Male)



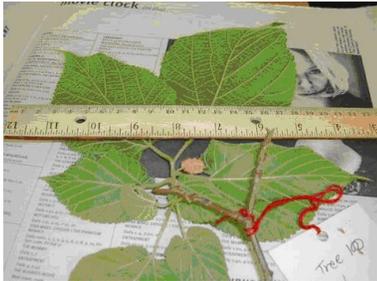
White Mulberry in fruit

(Continued on page 2)

Red Mulberry. If White Mulberry is being successfully sired by Red Mulberry males, this indicates that it may have yet another advantage in mixed company.

We know that White Mulberry and Red Mulberry can hybridize from other sources, and our preliminary crosses indicate that trees on Konza are no exception. It is hoped that with the aforementioned molecular markers we can begin to understand the extent of natural hybridization between these two species on Konza.

A guide to identifying Red and White Mulberry



Leaf of Red Mulberry



Leaf of White Mulberry

Leaves: Red Mulberry leaves are larger (4-12 inches) than White Mulberry (3-6 inches). They are dull green in color and are rough (scabrous) on the upper surface. The leaf underside is densely hairy (soft to the touch), the leaf base is often cordate (heart-shaped), and leaf apex tends to be caudate (tail like). Teeth on the leaf margin are often pointed. The main vein looks more or less like the color of the leaf. White Mulberry leaves are usually bright green and shiny above.

The lower surface has few hairs concentrated along the main veins. The leaf base is more rounded with and the apex is obtuse. The leaf margin has rounded teeth. The main veins (underside) contrast more with the leaf surface than in Red Mulberry.

Buds: Red Mulberry buds are usually larger; the bud scale margins have a dark apical band. In White Mulberry, the bud scale margin has a lighter brown band at the apex. **Twigs:** In Red Mulberry are usually pale tan, but that of White Mulberry look like pinkish-brown.



Bark of Red Mulberry



Bark of White Mulberry

Bark: Red Mulberry has grayish bark with flattened, thinner ridges that peel back in older trees. White Mulberry bark has thick and solid ridges that are more of a reddish tan coloration.

Branching pattern: The orientation of branches in a mature Red Mulberry is somewhat planer (flat) and spreads like an umbrella. In White Mulberry the branching is more diffuse and the plants appear more rounded or bushy as a result.



Red Mulberry branching



White Mulberry branching

Tallgrass Gazette Editors:

Gordon Cunningham - cunningham@networksplus.net
Gerry Snyder - gsnyder@ksu.edu

Prairie Patter

By Dr. Valerie Wright, Environmental Educator and Naturalist



Docent Roundup

The winter months have been spent quietly but busily working on databases, web site improvements and additions, grant proposals, and general catching up activities. It was exciting to plan the Docent Roundup and then to see all 54 of you come and enjoy the morning with us. Roy Beckemeyer's dragonflies and damselflies caught everyone's fancy. We will be seeing Roy again in late July for a field trip to the creeks, puddles, and ponds of Konza to search for real, live dragons and damsels.

My brief exposition on the "State of KEEP" put numbers to our activities, especially those with docent

participation. If bodies are counted, 220 individual docents volunteered in 2005. Since there are only 100 on the active docent list, and only 56 of those actually participated, several obviously volunteered several times. Docents participated in 123 of 177 events and spent an estimated minimum of 1230 hours working for KPBS. Visitors this year included 2,053 students. SLTER activities were experienced by 1,014 children.

You should have received in the mail some of the handouts from Roundup, if you did not attend. Among them is an evaluation sheet for the docent program of 2005. We value your comments and suggestions, so please send that form back to us as soon as possible. Also try out the Web Scavenger Hunt at home.

The 10th Anniversary of KEEP will include more field trips and information for your enjoyment. For example, Dr. Eva Horne will lead an expedition of rock-turning docents in search of herps. The date will be announced for March or April pending spring weather conditions. A committee has been organized to help plan the 10th Anniversary. If you would like to be a member and toss in your ideas, please give us a call (587-0381) or e-mail konzaed@ksu.edu.

The next Konza date on your calendar should be Saturday, February 25, 9:00 a.m. for New Docent Orientation. If you know someone who might be interested, encourage him to come or bring her out yourself.

SPOTLIGHT! On Martin Pankratz *By Annie Baker*

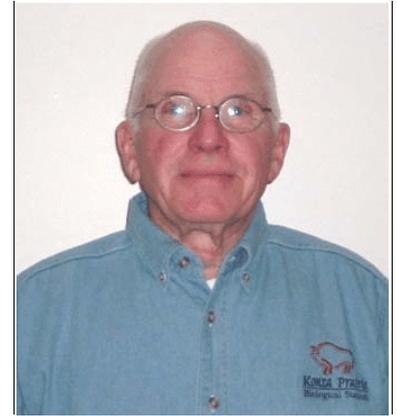
Martin Pankratz graduated from the Konza Environmental Education Docent Program in 2005 as one of three Docent Trainees of the Year. His background as a science educator attracted him to the Schoolyard Long-term Ecological Research Program, for which he is already an integral volunteer.

Martin was born in Hillsboro, Kansas, but grew up in several small Kansas communities as his father changed teaching and coaching positions. After graduating from Salina High School, he earned a Bachelor of Science degree from Kansas Wesleyan University and his Master of Science from Oklahoma State University. In college, Martin participated in football and track, and was inducted into the Kansas Wesleyan University Football Hall of Fame.

For thirty-seven years, Martin served as a Science teacher and administrator. He also continued to earn advanced credits from colleges and universities, and conducted an Elementary Science Teachers Workshop at Harvard. During his career, Martin taught Chemistry at Southeast High School in Wichita for seven years, served as Science Director for Medford, Massachusetts, K-12 public schools for seventeen years, and returned to teaching Chemistry at a private Massachusetts school before retirement in 1993.

Martin and wife, Doris, have three children and five grandchildren. They are enjoying retirement in Manhattan, traveling, and spending summers at their cabin in Maine. He built the cabin in 1970 and continues to make improvements. Martin's hobbies include golf, volunteering at church, model railroading, collecting barbed wire, and attending KSU athletic events.

Martin became interested in the Konza Prairie Docent program because of his interest and experience in science education. He views science as an "action verb" and feels SLTER activities fit the bill. Martin also enjoys hiking Butterfly Hill and the Nature Trail, and driving the Bison Loop. Martin's favorite age group to work with is K through gray!



FYI

The KEEP web site has the New Docent Training Schedule and the In-service Calendar. You can print them from the "Docent Program" at www.ksu.edu/konza/keep. Also, you can find the bison herd data on the web if you click on "Science Activities" then Trail #8 and go to the bottom of the page for the herd statistics and some fun questions you can answer by using the database (LTER bison data queries).

The Spring Hokanson Homestead Workday is scheduled for Sunday afternoon, March 19, from 2:00 to 5:00 p.m. This is a time for everyone to enjoy an afternoon with friends, old and new. Bring a lawn chair and just relax or bring work gloves and participate in the list of things to do, including mowing, trimming, cleaning up the Hokanson barn and garden, checking the nest boxes and much, much more!

More details later, but put this date on your calendar!

A TRIBUTE TO *WILTON THOMAS*

Last September a group of students from Randolph Middle School took a bison tour with Wilton Thomas. The thank you notes expressed the feelings of so many children who, over the years, have experienced Wilton's knowledge and enthusiasm for the prairie. Here are some of their comments.

Dear Wilton,

Thank you for volunteering your time. I really liked learning about the bison and the bachelor groups and about the calves and cows. I liked learning about how you can tell limestone from flint. I used to know a lady who was 93 years old and was in good health. Well, thank you very much.

Dear Wilton,

Thank you for being our docent. I really appreciated you and your friend Miles. I learned a lot about bison and we saw a hole bunch of stuff and a cool lizard.

Dear Wilton,

Thank you for helping show us around. Konza Prairie is awesome. I still remember all of the flowers, Golden Rod, Snow Top, Indian Grass, Bison grass, and I forgot the funky named one. My dad also liked Konza Prairie. The Bison loop was the first time I got to see Bison. The Bisons are fascinating! Thanks lots!



Dear Wilton,

Thanks for telling us about bison, rock, and bison wallos. The best part was when we saw all the bison up close. Another cool time was when you dripped the acid on the limestone and the flint. I can't believe the limestone bubbled and the flint did not! Some of the buffalo wallos were huge, some small and some in the middle. Well thanks for the wonder tour!

You're the next contestant!

One way we plan to celebrate the 10th Anniversary of KEEP is with a commemorative t-shirt. Here's the twist — **we're holding a t-shirt design contest.**

Do you have the perfect idea for a new t-shirt design? As a docent, decide what makes KEEP special and submit your idea!

Visit our website or ask Annie for the official entry form and guidelines. (www.ksu.edu/konza/keep)

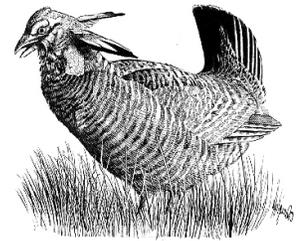




Tallgrass Gazette

Konza Prairie Office

Division of Biology
232 Ackert Hall
Kansas State University
Manhattan, KS 66506-4901
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Greater Prairie Chicken Viewing

In-service training: Docent Prairie Chicken Observations

This year docents are invited to reserve a seat in the blind on any date that places are available, March 17 through April 20. If you bring a friend, their fee is \$10/person. Meet your docent guide at the Scenic Overlook on Hwy. 177 before daylight and carpool to the blind. Experience the booming of the prairie chickens as they celebrate the spring mating season. We are limited to 7 persons in the observation blind each morning, so get your reservations in early! Contact Annie Baker to reserve your space, (785) 587-0381 or bunny@ksu.edu.

Share this unique opportunity with friends and neighbors!

KPBS is taking public reservations for its prairie chicken blind from March 17 to April 20, 2006. Viewing the courtship behavior of the Greater Prairie Chickens will be allowed with a guide assigned by KPBS with a charge of \$10.00/person. Details of where to meet and times, as well as regulations, will be given when the reservation is scheduled. In general, we enter the blind before daylight and remain in the blind until approximately 8:30 a.m., or until the birds have flushed.