

PRESENCE OF *PUERARIA MONTANA* (LOUR.) MERR. VAR. *LOBATA* (WILLD.) MAESEN & S.M. ALMEIDA EX SANJAPPA & PREDEEP (KUDZU VINE) IN TULSA COUNTY, OKLAHOMA

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ABSTRACT

Pueraria montana (Lour.) Merr. var. *lobata* (Willd.) Maesen & S.M. Almeida ex Sanjappa & Predeep (Fabaceae; kudzu) is a deciduous perennial vine native to China. An invasive species that has spread throughout much of the southeastern United States, kudzu covers large open areas, overtops forests, and causes significant ecological and economic damage. Oklahoma has seen a relatively minor impact from kudzu, and previous research indicates a limited (less than 0.04 hectare) presence in Tulsa County. We describe a previously undocumented population of kudzu covering over 6.5 hectares in Tulsa County. We determine the age of this population and its rate of expansion. Documenting and mitigating kudzu populations will likely become increasingly important to protect Oklahoma's native biodiversity.

INTRODUCTION

The spread of kudzu, *Pueraria montana* (Lour.) Merr. var. *lobata* (Willd.) Maesen & S.M. Almeida ex Sanjappa & Predeep, and its impact on the environment, economy, and biodiversity has been addressed in many publications. Kudzu is an aggressive species that has the ability to reduce biodiversity, compete for light and space resources with natives (Coiner 2012; Mitich 2000), and kill trees by creating large canopies with its heavy vines (Forseth and Innis 2004). It can fix nitrogen in the soil (Follak 2011), and it has a wide climatic range that promotes its spread (Claytor and Hickman 2015). Claytor and Hickman (2015) assessed the spread of this invasive, non-native species in Oklahoma and stressed the importance of continually updating knowledge regarding this ecologically and economically

detrimental species and its spread within the state. They estimated that kudzu was established in, but limited to, 0.04 hectares in Tulsa County and at least 32.4 additional hectares within the state (Claytor and Hickman 2015). Kudzu has been documented in 28 counties in Oklahoma, mainly in eastern Oklahoma (Oklahoma Vascular Plants Database)(Figure 1), and two locations in Tulsa County. We describe a previously undocumented population of kudzu currently covering approximately 6.5 hectares in Tulsa County.

STUDY SITE AND METHODS

The Tulsa kudzu site that we describe is distinct from the two locations listed in the Oklahoma Vascular Plants Database (<http://www.oklahomaplantdatabase.org>).

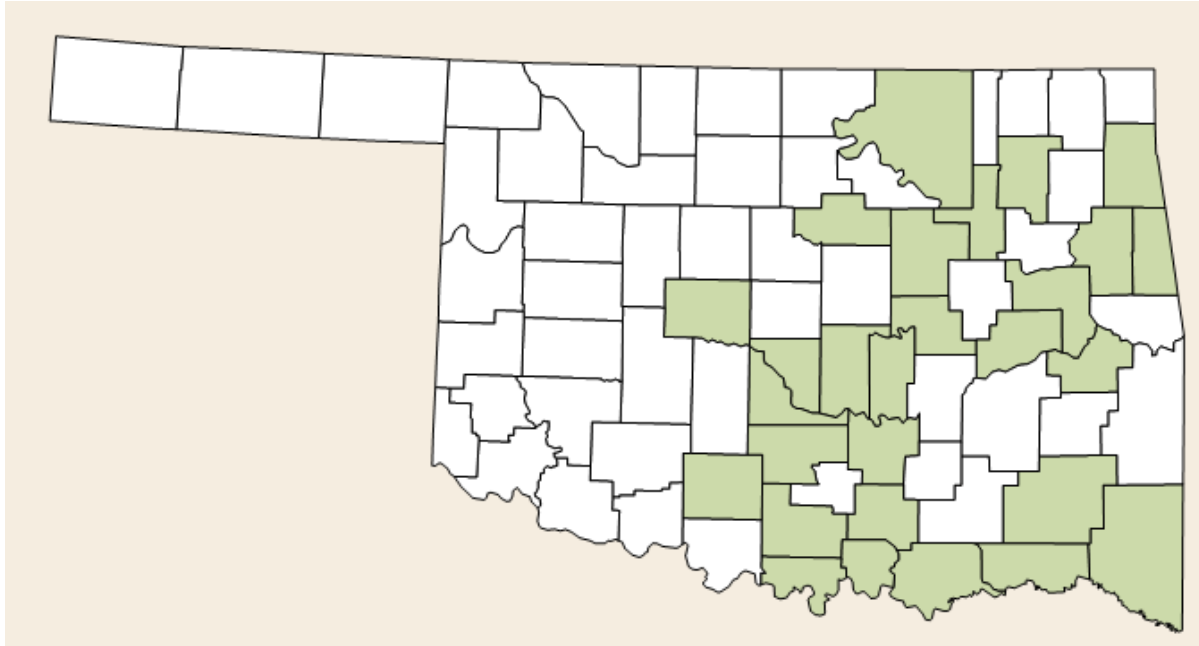


Figure 1 Oklahoma Vascular Plants Database map of kudzu occurrence by county. Kudzu presence in counties shaded green. <http://www.oklahomaplantdatabase.org>

December 2018) The new site is mainly established along Elm Creek and adjacent fields in southern Tulsa County. The site is located on various undeveloped private lands and Broken Arrow municipal property along Elm Creek. A voucher specimen for this population (Isaac Walker 01) was collected at 35° 59' 03" N and 95° 48' 10" W and deposited in the herbarium at OSU (OKLA). Google Earth and Google Earth Historical Imagery (Google Earth 2018) were used to estimate the area of kudzu at the site. The area was computed by using the polygon tool in Google Earth. The area was then ground-truthed on foot to confirm the extent of kudzu at the site.

DISCUSSION

From September 2002 to May 2017, we have estimated an increase in the area of the infestation from approximately 5.38 hectares to 6.52 hectares. Using Google Earth Historical Imagery, we determined that the kudzu infestation has been present

since at least 1995. Assuming the average rate of change found with our data, which is 0.13 hectares/year, has been consistent, we suggest that the kudzu infestation was most likely established in the 1950s. The poor resolution of Google Earth Historical Images led to uncertain measurements of the kudzu's spread until 2002, and there were no pictures available from before 1995. Although observed flowering in early September of 2017, the kudzu in Broken Arrow was not observed to produce seeds during subsequent trips to the location. Many stems were observed rooting at the nodes, and presumably, the entirety of the spread of kudzu at the site has been vegetative. In this location, kudzu has essentially created a monoculture landscape in large open areas (Figure 3), and overtopped mature trees in the forest (Figure 4). Forbs and grasses were essentially absent in the open areas, and mature trees were observed to have been killed by the kudzu. The documentation of the 6.5 hectare site in Broken Arrow is an

addition to the kudzu records for Tulsa County, which was previously estimated at 0.04 hectares (Claytor and Hickman 2015),

and it demonstrates a need for the documentation and management of kudzu in Tulsa County.

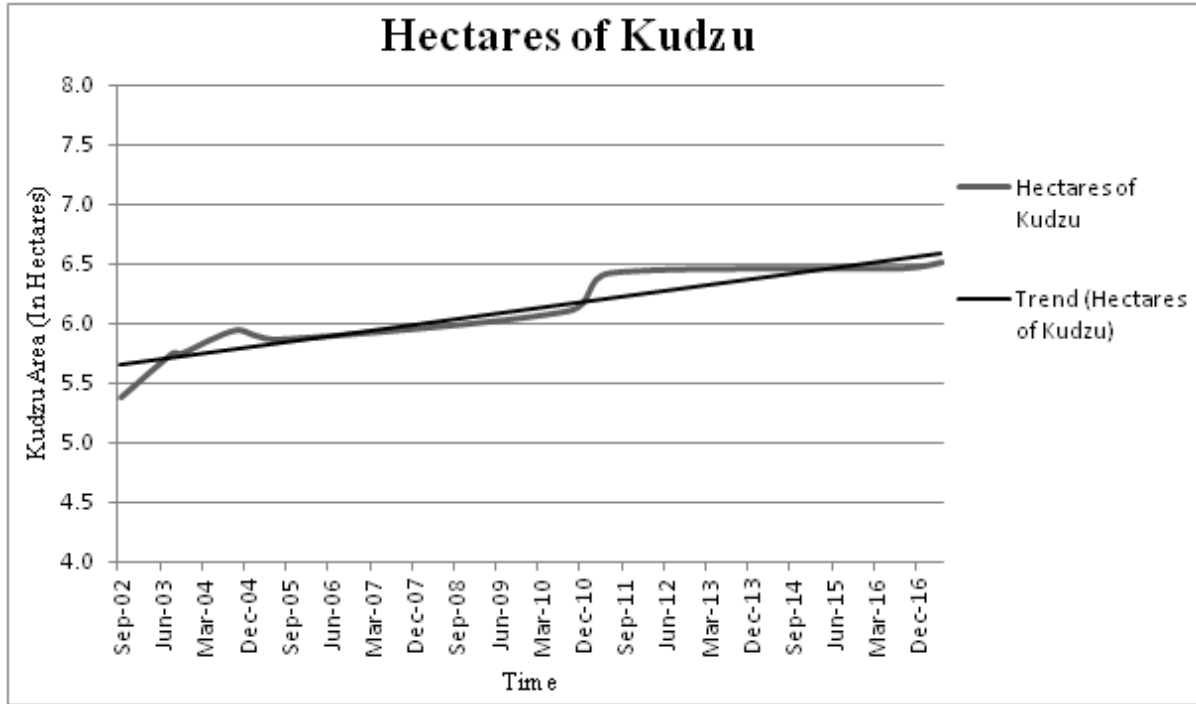


Figure 2 Change in area infested by kudzu using Google Earth Historical Imagery (Google Earth 2018) at the Broken Arrow site

Table 1 Hectares of kudzu present from 2002–2005, 2010, 2011, 2016, and 2017 using Google Earth Historical Imagery (Google Earth 2018)

Google Earth image date	Sep. 2002	Aug. 2003	Oct. 2003	Oct. 2004	Jul. 2005	Sep. 2010	Jun. 2011	Sep. 2016	May 2017
Estimated hectares	5.38	5.75	5.75	5.95	5.87	6.11	6.43	6.47	6.52



Figure 3 Kudzu patch at the Broken Arrow site, August 2017. Photo by Isaac Walker.



Figure 4 Kudzu invasion in field and over trees at the Broken Arrow site, August 2017. Photo by Isaac Walker.

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