

**AVIAN FORAGING ON OSAGE ORANGE (*Maclura pomifera*)
FRUIT DURING WINTER**

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Abstract—We document three different bird species feeding on the fruit of Osage orange (*Maclura pomifera*) during winter months in both Oklahoma and Kansas: Harris's Sparrow (*Zonotrichia querula*); Tufted Titmouse (*Baeolophus bicolor*); and Northern Cardinal (*Cardinalis cardinalis*).

INTRODUCTION

The Osage orange (*Maclura pomifera*) tree, sometimes referred to as Bois d'arc, produces a fruit that is popularly thought to be toxic, poisonous, or inedible (Fatnassi *et al.* 2009). The fruit contains isoflavones (Tsao *et al.* 2003) which produces stomach irritation and a chemical taste that could lead animals to find it unpalatable. Other research determined the fruit and juice did not produce poisonous effects on birds or mammals (Johnson *et al.* 1935). However, mammals, such as squirrels (*Sciurus* sp.) forage on Osage orange fruit (Martin *et al.* 1951). Osage orange fruit can be palatable and digestible to some species of wildlife (Short and Epps 1976). Fatnassi *et al.* (2009) determined that Osage orange seeds contain useful fatty acids as well as tocopherols, sterols, and polyphenols that act as antioxidants.

We documented several instances of three different bird species feeding on the fruit or seeds of Osage orange trees during winter. Winter conditions may have forced these species to consume fruit and seeds not typically used by these species during less severe weather conditions.

OBSERVATIONS

Observation 1

On 8 February 2014, DW, PL, MA, and BS assisted with the annual Oka' Yanahli Preserve Winter Bird Count in Johnston County. The weather was severe with ice on the roads, snow cover 5-7 cm deep, strong winds (<27 kph), and cold temperatures (0-1°C). While counting birds on the southeastern portion of the Preserve, we observed two Harris's Sparrows (*Zonotrichia querula*) feeding on an Osage orange fruit. The fruit was laying on the ground 2 m from a row of Osage orange trees in a riparian zone along the Blue River. There was approximately 5-6 cm of snow on the ground with an icy crust, thus seeds were likely unavailable at this location for foraging. We watched as two different Harris's Sparrows landed on and beside an Osage orange fruit that was previously opened by a squirrel. Although we did not see a squirrel open that specific fruit, squirrel tracks were present in the snow around the Osage orange fruits.

One Harris's Sparrow pecked at the fruit, not seeds, while standing on top of the fruit. The sparrow then hopped to the ground and pecked at the fleshy portion of the fruit. A second Harris's Sparrow landed by the fruit and briefly pecked at the fruit before flying into the Osage orange tree. We saw remnants of the fruit on the bills of both sparrows. We were unable to observe if any seeds were consumed by the sparrows. The total encounter lasted about 2 minutes. We saw several other Harris's Sparrows in the same flock, but none foraged on the open Osage orange fruits.

Observation 2

Approximately, 30 minutes later, DW and BS observed a Tufted Titmouse (*Baeolophus bicolor*) feeding on an Osage orange fruit wedged in the fork of a tree along the Blue River. We saw the titmouse pecking at the fleshy fruit for several seconds before it flew back into cover. We did not see the titmouse return to forage on the Osage orange fruit.

Observation 3

In December 1988, EY documented feeding on Osage orange fruit by Northern Cardinal (*Cardinalis cardinalis*) and Tufted Titmouse in Cowley County, Kansas. He observed birds of both species eating Osage orange fruit near Arkansas City. Several centimeters of snow cover were present, although EY did not record specific snow depth at the site of the observation.

Observation 4

On 10 December 2010, EY observed a mixed-species flock along Beaver Creek at the Kaw Reservoir in Kay County, Oklahoma. Weather during the day was mild with a temperature of -2.8-10°C; winds were from the south up to 8.1 kph and skies were clear with no snow cover or precipitation. The flock contained Northern Cardinals, Tufted Titmice, Harris's Sparrows, Carolina Chickadees (*Poecile carolinensis*) and American Tree Sparrows (*Spizella arborea*). EY documented a Tufted Titmouse perching on top of an Osage orange fruit and picking out white pieces of fruit. The fruit appeared to have been opened by a squirrel. A Northern Cardinal landed by the fruit and foraged on the fruit simultaneously as the titmouse. Both birds flew away after approximately 20 seconds of observation.

Observation 5

On 26 December 2010, during the Arkansas City Christmas Bird Count in southern Kansas and northern Oklahoma, EY observed two separate instances of birds feeding on Osage orange fruit. The sky was overcast, but no precipitation or snow cover. Temperature ranged from -4.4-1.7°C with light winds (4.8-11.3 kph). On the Kaw Wildlife Area, Cowley County, in Kansas, EY noticed numerous Osage orange fruits opened by squirrels along a hedgerow. A Tufted Titmouse was observed poking its head into an open Osage orange fruit and appeared to be feeding repeatedly, although EY could not specifically see if the titmouse was removing fruit or seeds. On the same day, but on the Oklahoma side of the Kaw Wildlife Area, Kay County, EY observed a Tufted Titmouse feeding on an Osage orange fruit crushed by a vehicle. The titmouse was consuming either the flesh or seeds, but did have fruit stuck to its bill. The titmouse flushed down the road to another previously opened Osage orange fruit, but one that was opened by squirrels. EY observed the titmouse extracting seeds from the fruit.

DISCUSSION

It is well documented that Harris's Sparrows eat seeds and fruits of many plant species during winter (Nice 1929, Swenk and Stevens 1929, Norment and Shackleton 2008); however, we were unable to find references to Harris's Sparrows feeding on Osage orange fruit or seeds. This fruit is typically unavailable to birds given the tough epicarp. Squirrels or cars can open these fruits and allow birds to opportunistically forage on the fruit.

Tufted Titmice have not been documented feeding on Osage orange fruit in the literature, but are known to consume seeds and fruits (Bent 1946, Grubb 1978, Baumgartner and Baumgartner 1992, Grubb and Pravasudov 1994). Observations of this species comprised the majority of observations in this report. They may more readily take advantage of open Osage orange fruits to obtain seeds and fruit during difficult winter foraging conditions.

Northern Cardinals frequently forage on fruits and seeds year-round (Laskey 1944, Dow 1969, Baumgartner and Baumgartner 1992). Although their bill is strongly adapted to opening nuts and fruits, there are no observations documented in the literature of cardinals opening or eating Osage orange fruit. Cardinals may opportunistically forage on Osage orange fruit during extreme winter conditions or if squirrels open the fruit.

All of our observations occurred during winter when food may be both limited and difficult to obtain. Our sighting in 2014 typified this problem with substantial snow cover and an icy crust. Granivores, like cardinals, titmice, and sparrows, likely experienced difficulty accessing seeds on the ground. The weather may have forced these species to forage on a fruit not typically used during better weather and ground conditions.

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