Dealing with Urban Ginkgo Seeds: Turning a nuisance into a new local food product

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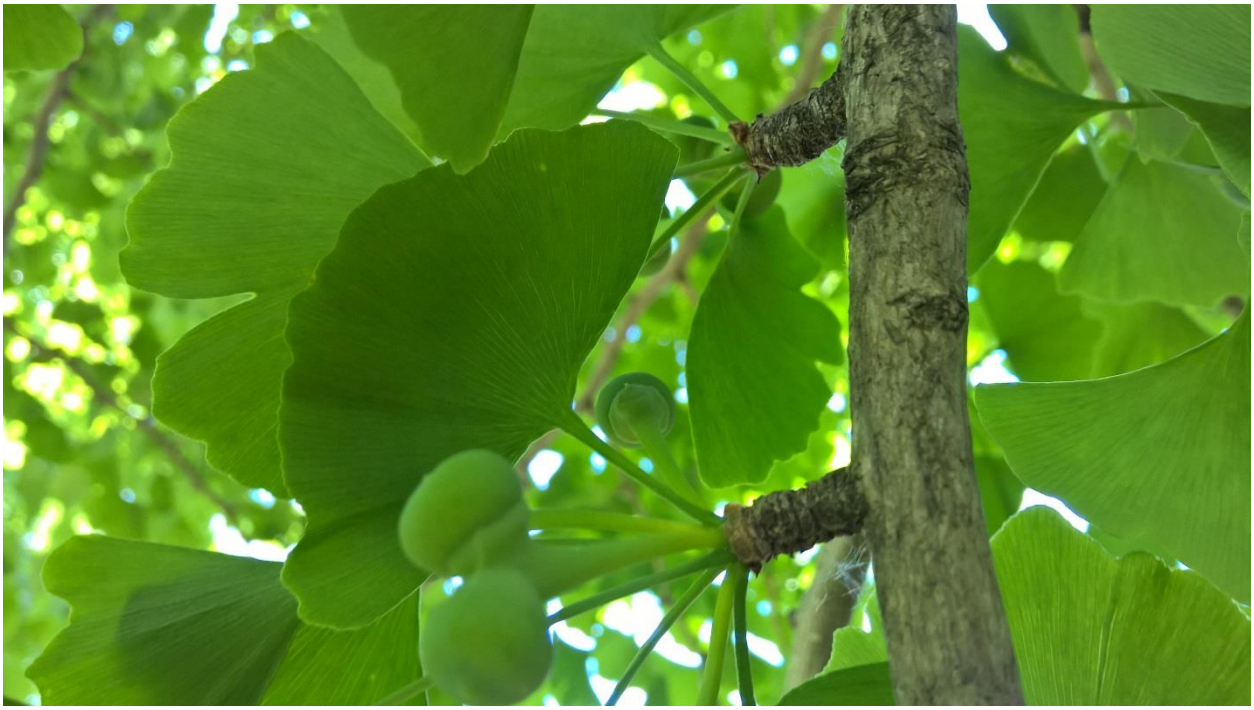
Ginkgo biloba can be a divisive tree in the urban environment. Many enthusiasts believe ginkgo to be one of the best urban tree species for the Northern Midwest region. It has seemingly no pest or pathogen issues, resists urban pollutants, puts up with tough planting locations and turns a vibrant golden yellow in the fall. On the flipside, many know of ginkgo simply for its obnoxious seed, which releases a strong odor as the outer seed coat decomposes. It is this odiferous aspect of ginkgo that accounts for the majority of removals in urban locations. But does it need to be this way? A small project housed between the Department of Forest Resources and Department of Horticultural Science is asking this question.



Ginkgo is an important link to the past both botanically and culturally. *Ginkgo biloba* is the only living species of a once diverse division known as Ginkgophyta. These seed plants were common across the northern hemisphere as far back as 300 million years ago (Leistner &

Drewke 2010). Now, it is believed there are only two small remaining populations of wild ginkgo trees located in China (Gong et al. 2008). *G. biloba* is currently on the endangered species list - a notion that is odd to comprehend due to the tree's ubiquity in the landscape.

The earliest modern ginkgo trees arrived in the United States in the late 18th century. Ginkgo is a dioecious species, and it became apparent to astute and non-astute observers alike that the seedless male trees are more desirable for the urban environment than the seed producing female trees. In spite of this knowledge, a number of seed producing trees were still planted into the landscape. The reason for the seeming mishap is unclear. One explanation is that selected stock plants were falsely believed to be male cultivars when in fact these trees were females that had yet to reach sexual maturity, a consequence of ginkgo taking multiple decades to reach seed baring age.

There is also the not too uncommon theory that these seed producing trees resulted from a sex change of males converting to female. This theory is not totally unfounded as there are a number of accounts from around the world of very old male ginkgo trees spontaneously producing seed (Crane 2013). What is common in these accounts, however, is that there does not seem to be a complete canopy wide change of sex, rather isolated branches in the canopy producing some seeds. Interestingly, there are also accounts of monoecious trees. In one research trial of 638 seedling ginkgo, four trees were found to be monoecious, predominated by male catkins with a few female ovules (Santamour et al. 1983). Modern genetic tools have allowed researchers to identify a single marker which can be utilized in determining the sex of ginkgo seedlings (Jiang et al. 2003, Echenard et al. 2008).

Simply stated, the ginkgo seeds for many are a public nuisance. The smell is produced by the release of butanoic and hexanoic acid from the outer-fleshy seed coat known as the sarcotesta (Tredici 2000). Compounding the matter is the fact that gingko is a prolific seed producer, with mature trees dropping hundreds of pounds of seed each year. The presence of seed producing trees in the near vicinity of houses and public sidewalks results in a number of requests for ginkgo tree removals each year.

For other residents, however, the seed is seen as a healthful food and medicine. This is especially so for East Asian cultures. Cultivation of ginkgo trees and use of the seed as a food source dates back thousands of years in China. In the present day, commercial seed production is estimated at between 5,000-6,000 tons per year (He et al. 1997). In Western cultures, however, it was the leaf extract that gained popularity as a supplement with purported neurological benefits.

The historic use of ginkgo seed as a healthful food, paired with the negative public perception of the seed in the urban environment, led university researchers in the departments of Forest Resources and Horticultural Science to undertake a project to assess the potential for urban produced ginkgo seed to be harvested commercially for human consumption. The benefits of collection and subsequent sale of urban ginkgo seed are two-fold; 1) collection of seeds from the landscape will reduce the negative impact on residents, resulting in fewer requests for removals and thereby retain the environmental benefits of these potentially long-lived trees, and 2) the sale of urban ginkgo seed will provide a new local food revenue source.

Work on this project began with a grant from the Minnesota Department of Agriculture's Specialty Crop Block Grant Program to ensure that the urban grown seeds do not pose any health risks to those consuming them. This is being accomplished by assessing seeds for the presence of any heavy metals as well as a compound called ginkgotoxin (4'-*O*-methylpyridoxine), a known neurotoxin.

So far the results of the food safety research are promising. The challenge moving forward will be creating the mechanisms and supply chain to harvest and sell the seeds. Future research on harvest mechanisms will look at ways to efficiently collect seeds from urban trees. For example, mechanically shaking the trees in the autumn so all the seeds are removed at one time. And, of course, we can't forget a good method for cleaning the seeds.

The other critical piece of the puzzle is public education. It is understandable that citizens are annoyed by the presence of the seed each year. But where problems lie, so does opportunity. Hopefully someday folks will have more than just tree removal as an option for managing the seeds.

A. raw ginkgo nuts, B. ginkgo nuts (no shell), C. honey ginkgo nuts, a dish to nourish the lungs and trachea, D. dry fried ginkgo nuts are used to relieve asthma, E. salty roasted ginkgo nuts are used as healthy snacks, F. ginkgo shrimp is a common Chinese dish, G. ginkgo asparagus, another famous Chinese dish

For more information on the project, contact Ryan Murphy at murph523@umn.edu.

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