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PEPPER WAX: AN ORGANIC SQUIRREL DETERRENT FOR LEAD

LAUREN FAIR AND ADAM JENKINS

Damage from squirrels to lead garden sculpture at the Winterthur Museum, Garden & Library occurred over several decades and was so widespread that almost every lead sculpture was relegated to storage to stop the problem. Within the last decade, many original lead pieces have been conserved and returned to the gardens. A cayenne pepper wax recipe has been employed as part of the annual maintenance program and so far has done the trick to deter squirrels. This tip presents the practical side of how to mix the wax, how to apply it, and what to expect in terms of its appearance and maintenance needs.

KEYWORDS: Lead, Cayenne, Pepper, Wax, Squirrels, Outdoor sculpture

1. INTRODUCTION

Many design movements were influencing American estates and gardens throughout the 18th to 20th centuries, with inspiration from the formal Italianate, Renaissance Italian, or picturesque English garden styles. Achieving these styles hinged on the right ornaments—from structures and benches to water features and sculptures, as well as sundials, astrolabes, armillary spheres, urns, and planters.

Historically, collecting garden ornaments was a luxury for the rich and a passion of the elite (Israel 1999). Such was the case with Henry Francis du Pont, founder of the Winterthur Museum, Garden & Library, who was not only an avid collector of American decorative arts but also an avid gardener. He was extremely involved in the decision making over the design of his gardens, down to every last detail (fig. 1).

While garden ornamentation was made in a variety of materials—such as stone, wrought iron, bronze, and cast stones—lead became a popular material in 17th- to 18th-century England, as it was easily worked and highly durable. Shops in London increasingly made and sold lead statuary, vases, cisterns, and decorative downspouts, which were in high demand by English nobility (New England Garden Ornaments 2015). This allowed for casting repetitive forms and made it even easier for American collectors to reproduce the English garden aesthetic, a tradition much revived at the end of the 19th century in America.

Of Winterthur's 400 plus garden ornaments, over 100 of them are made of lead. Only three of the sculptures are displayed outside in the gardens today; all of the others not mounted on a wall or roof are in storage (fig. 2). This is because over the years the squirrels had their way with them, and the only solution at the time was to bring them inside. According to institutional knowledge, this took place during the 1980s and 1990s. This was also during a time when garden objects had no comprehensive oversight. During the past ten years, this has happily changed, and now Conservation, Gardens, and Curatorial work together to manage a thorough and successful treatment and maintenance program of the garden object collection.

2. SQUIRRELS

There are over 200 species of squirrels, inhabiting six of the seven continents (fun fact: no squirrels live in Australia) (National Geographic 2010). The species that inhabit North America, and the United States



Fig. 1. Winterthur Gardens, view of reflecting pool from East Terrace (Courtesy of R. Lautman and Winterthur Museum)

specifically, can be grouped into five different types: the gray squirrel, of which there are several species, including the Western black squirrel; the fox squirrel, which is the largest; the little red squirrel; the ground squirrel; and the flying squirrel, which is nocturnal. The most common in the area of Eastern Pennsylvania and Delaware is the Eastern gray squirrel, or *Sciurus carolinensis* (fig. 3).

Squirrels' incisors grow continuously, as do those of all rodents and some other animal groups. This means that their teeth will continue to grow in length and ultimately compromise the health of the



Fig. 2. Images of lead sculptures in barn storage at Winterthur (Courtesy of Winterthur Museum)



Fig. 3. The Eastern gray squirrel

squirrel if not worn down through gnawing. Lead is in many ways an ideal material to chew on from a squirrel's perspective. It is a softer metal, and many of its corrosion products, including lead(II) acetate, are sweet. In fact, writers of the Classical Era (e.g., Cato the Elder, Columella, and Pliny the Elder) "...recommend lead (or lead-coated) vessels in the preparation of sweeteners and preservatives added to wine and food. The lead conferred an agreeable taste due to the formation of 'sugar of lead' (lead(II) acetate)" (Wikipedia. s.v. "Lead" 2017).

People always ask what, in fact, happens to squirrels when they chew on lead. We have found varying opinions on whether the squirrels get lead poisoning from their habit or if it passes through their system since they are consuming larger chunks and not breathing in particulates. Regardless, they live long enough to teach their young the practice and can do amazing amounts of damage to lead flashing, roof material, and, of course, to our lead garden sculpture (fig. 4).

3. PEPPER WAX AS A SOLUTION

There is a lot of scientific literature on controlling rodents, particularly the proceedings from many vertebrate pest conferences (Fitzgerald et al. 1995; Gill et al. 1995; Mason 1998). For some reason, there was a particularly large amount published in the mid- to late 1990s. Much of the research centers broadly on the use of peppers, capsaicin in particular, or cinnamon oil, particularly cinnamamide or cinnamaldehyde.



Fig. 4. Details of squirrel damage to lead sculptures

We learned about the idea of pepper wax for lead outdoor sculpture anecdotally: Adam heard about it being used in England, but we do not know who came up with the original idea. There are many academic publications about using pepper or cinnamon to control small mammals in the late 1980s—for instance, by adding it to birdseed to keep squirrels out of feeders (Fitzgerald et al. 1995).

We came up with a wax formula and began testing it in three places starting in 2014. In addition to Winterthur, we also employed it at the Mount Cuba Center in Hockessin, Delaware, where they have a variety of lead sculptures out in their gardens, and on several lead urns at Rittenhouse Square, a preeminent park in Philadelphia, Pennsylvania.

The wax recipe consists of the following:

- Three parts Be Square 195 microcrystalline wax—A wax with a melting temperature of approximately 195°F that contains normal paraffinic, branched paraffinic, and naphthenic compounds
- One part Be Square 175 microcrystalline wax—A wax with a melting temperature of approximately 175°F to 180°F containing a higher concentration of branched hydrocarbons that make it much less crystalline than paraffin or hard microcrystalline waxes
- 3% by weight Petronauba C—A synthetic carnauba wax used in modifying wax coatings to impart a degree of hardness that allows for adequate buffing and taking on a shine
- 25% by weight cayenne pepper¹
- Equal amount by weight ShellSol D38 or other mineral spirits solvent

We make it by mixing the three waxes and melting them over a hot plate. Using an empty paint can from the hardware store as the mixing container works well. This is done under a fume hood and while wearing all appropriate personal protection equipment, including gloves, an apron, and safety glasses.

Once the wax mixture is liquid, the cayenne pepper is carefully added and stirred in. The cayenne is “cooked” into the wax for 15 to 20 minutes, turning the wax mixture orange.² Finally, the wax is removed from the heat and an equal weight of mineral spirits is added. This is what makes the wax mixture a paste at room temperature. The solution is quickly stirred together and then strained through a few layers of cheesecloth into its final receptacles to remove the pepper grains. Lauren usually does not do this final straining step and nevertheless has had good results with the wax mixture that she prepares and uses.



Fig. 5. Winterthur lead roosters before treatment (top left, top right) and after treatment and reinstallation into the gardens (bottom left, bottom right). Roosters, 1908-1927, lead, 70 cm H × 52 cm W × 36 cm D. Winterthur Museum, Garden & Library, 1969.4080.001 and 1969.4080.002 (Courtesy of Winterthur Museum).

3. PEPPER WAX IN PRACTICE

The wax can be applied cold or hot (with gentle heat from a propane torch or electric heating device). Care should be taken when heating near solder joints as those alloys typically melt at a much lower temperature than the lead itself. When applied cold, the pepper wax does not alter the surface in any significant way and yields the light-gray color that we see in an uncoated piece, whereas solder repairs are highlighted as darker areas. When applied hot, the pepper wax saturates the lead, leaving a darkened gray color, and helps to even out visually the variegations in the metal surface. In either hot or cold applications, once solvent has evaporated, the wax can be buffed to the desired degree with stiff bristle brushes and/or soft cotton cloths.

Cayenne pepper can be added to any wax mixture. The recipe provided earlier is not exclusive to this technique and practice; this is just the one that we have found works well in an outdoor environment in our region.³

The lead roosters at Winterthur (fig. 5) are two sculptures of several that have been treated in this manner in the southeastern Pennsylvania/Delaware region. They are now on an annual maintenance program and receive a fresh coat of pepper wax each year, like the other lead at Winterthur. We have not noticed any new squirrel damage to our lead sculptures since 2014, when the treatments began. At Mount Cuba, where the maintenance cycle is every two years, staff noticed only one “hit” by squirrels since 2014. Rittenhouse Square is also showing very promising results, by which we mean no new squirrel damage.

As chewing on lead by squirrels is a learned behavior, it can be reasonably expected that a significant reduction in activity will occur in the first cycle, with increased success in future cycles.

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NOTES

1. We have not tried using capsaicin extract, which is colorless, in place of cayenne pepper. This should work just as effectively, in theory; we would love to hear from anyone who tries this.
2. Though the cayenne pepper imparts an orange color to the wax mixture, it does not cause a noticeable color change in the lead objects to which it is applied.
3. Adam was asked after the session if there is any concern about the effect that capsaicin might have on the metal. We have seen no negative effects on the objects, and being practically insoluble in water—0.00013g/L (Wikipedia. s.v. “Capsaicin” 2017)—it is unlikely to have any noticeable pH effect.

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SOURCES OF MATERIALS

Be Square 195 White microcrystalline wax, Petronauba C synthetic carnauba wax
Conservation Support Systems
PO Box 91746
Santa Barbara, CA 93190
800-482-6299
<http://www.conservationssupportsystems.com/>

Be Square 175 White microcrystalline wax
Talas
330 Morgan Ave.
Brooklyn, NY 11211
212-219-0770
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