



Quit Eating My Signs! Pepper-Based Coating Discourages Animals from Damaging Structures

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Animals peck and chew buildings, signs, and utility lines and cables at U.S. Department of Agriculture Forest Service facilities across the nation (figure 1). Forest Service employees have tried many methods to discourage animal damage. Some methods have worked better than others, but all seem to have their limitations. The Forest Service's Technology and Development program has been asked to investigate methods to prevent animals from damaging facilities many times over the years and has produced several recent reports on the topic, including:

Controlling Rodents in Forest Service Facilities:

Reports from the Field

(<http://www.fs.fed.us/t-d/pubs/htmlpubs/htm04712332/>,

Username: t-d, Password: t-d)

How To Prevent Woodpeckers from Damaging Buildings

(<http://www.fs.fed.us/t-d/pubs/htmlpubs/htm00712847/>,

Username: t-d, Password: t-d)

The Products

During the late summer of 2003, the Missoula Technology and Development Center (MTDC) learned of a new product manufactured by EcoCote International that claims to deter animals from chewing surfaces that have been coated with the product. The active ingredient is a concentrated food-quality oleoresin capsicum extract.

The company manufactures the extract from habanero peppers. Habanero, or *Capsicum chinense*, is a particularly potent pepper native to the Yucatan Peninsula of Mexico, Belize, and Guatemala.



Figure 1 — This porch post at a historic ranger station in the Intermountain Region was damaged by a beaver or porcupine during the winter of 2003–2004.

The coating is produced using a patented process that molecularly bonds the pepper extract to paints, stains, plastics, and other rubberized products. The product is water based and nontoxic, contains no volatile organic compounds or solvents, and cures into a clear, flexible coating.

The manufacturer provided MTDC with results from tests conducted in Australia, Japan, Kenya, and the United



States on surfaces subject to damage by termites, zebra mussels, mice, woodpeckers, baboons, and elephants. The company's tests showed that animals are less likely to chew or peck surfaces coated with the product.

Based on the company's results, it appears that the product might help the Forest Service prevent damage to structures and utilities, but the company's tests were not conducted under typical Forest Service field conditions.

Informal Field Tests

MTDC obtained 2 gallons of the product mixed into a clear paint-like coating. Several ranger districts volunteered to field test the coating informally. Three districts were chosen based on the animal causing the damage, the ease of access, and the type of material being protected. A fourth site at a Forest Service corral was chosen, but a private corral was substituted when the Forest Service corral became unavailable at the last minute. The test locations were:

Northern Region (R-1), Helena National Forest, Lincoln Ranger District, MT

Animal causing damage: Porcupine

Protected surface: Plywood roadway signs

Intermountain Region (R-4), Sawtooth National Forest, Sawtooth National Recreation Area, ID

Animal causing damage: Woodpecker

Protected surface: Wooden board and batten siding on a campground vault toilet

Corral, private horse property near Frenchtown, MT

Animal causing damage: Horse, mule

Protected surface: Peeled softwood pole corral rails

Pacific Northwest Region (R-6), Gifford Pinchot National Forest, Mount St. Helens National Volcanic Monument, WA

Animal causing damage: Chipmunk

Protected surface: Plastic weather seals on overhead doors at the maintenance shop

Informal tests at these sites involved painting one portion of a sign, wall, or corral rail with the habanero coating while leaving an adjacent portion uncoated. In addition to these tests, the coating was applied to plastic insulated wiring and hard plastic equipment boxes used by Forest Service law enforcement officers in Kentucky,

Arkansas, and South Carolina. Rodents had been ruining surveillance operations in these areas by chewing through the plastic boxes and shorting out the wiring.

Results

The results of the field tests at the Sawtooth National Recreation Area, the Lincoln Ranger District, and the private corral were dramatic. Figures two and three show the difference in damage done to coated and uncoated halves of a roadway sign on the Dry Creek Road (No. 4106) in the Lincoln Ranger District of the Helena National Forest. Three other signs along the Dry Creek Road also were treated, with the same results. The test showed that porcupines prefer not to chew on coated signs.



Figure 2—The back of the Dry Creek road sign in the Helena National Forest's Lincoln Ranger District in October 2003 just after the left half of the sign was painted with habanero coating.



Figure 3—The back of the Dry Creek road sign in July 2004. The treated (left) half of the sign shows no further damage, while the untreated (right) half has been chewed severely.

The results were similar at a Pettit Lake Campground vault toilet in the Sawtooth National Recreation Area, ID, where woodpeckers were damaging the wooden siding. There was little new damage to the coated areas, but woodpeckers had made several new holes and abrasions on the areas that were not coated (figures 4 and 5).



Figure 4—The Pettit Lake vault toilet already had some woodpecker damage when the habanero coating was applied to the left side of the structure in October 2003.



Figure 5—In October 2004, new woodpecker damage was minimal on the left side of the structure, which was treated, but damage was substantial on the front of the building, which was untreated.

The woodpeckers evidently preferred to peck where there was no habanero coating. Because only part of the structure was coated, it is not clear whether the birds would leave a completely coated structure alone.

The coating also was applied to a vault toilet at the Alturas Lake Campground in the Sawtooth National Recreation Area. District employees patched and painted that structure in July 2004, making it difficult to tell whether the coating had worked. Because woodpeckers don't actually bite the treated surface, they may not be repelled as strongly as animals that chew the surface. Providing a nest box nearby or a drumming post (see *How to Prevent Woodpeckers From Damaging Buildings* referenced earlier) probably would increase the coating's effectiveness in deterring woodpeckers.

At the private corral, the horses immediately learned to leave the habanero-treated corral rails alone. They continued to chew untreated rails, severely damaging many of the untreated rails. One new untreated rail was chewed completely through in 8 months. The horses took several small "test nibbles" at intervals on the treated rails, especially near the salt block and watering trough, but they had not significantly damaged the rails 7 months after treatment.

A different, lanolin-based habanero product from the same manufacturer was applied to some of the rails in a second corral in June 2004. The lanolin-based coating appears to do a better job of preventing horses from damaging corral rails than the clear coating. Seven months after treatment, the lanolin-treated rails had not been chewed at all.

The only test application with ambiguous results was at the Mount St. Helens maintenance shop. Chipmunks had chewed through the seals at the bottom of four overhead doors to get into the maintenance shop, damaging the seals almost every day. The damage was so severe that the seals were replaced every year or two (figure 6). Clear habanero coating was applied to the seals at the bottom of two of the overhead doors in October 2003. After 8 months, only one hole had appeared in any of the door seals. It was an exit hole in one of the treated seals (figure 7). Ten months after treatment, another small exit hole appeared, this time in an untreated door seal. No further holes had appeared 16 months after treatment.



Figure 6—Chipmunks severely damaged overhead door seals, which were replaced every year or two at the maintenance shop in the Mount St. Helens National Volcanic Monument.



Figure 7—This hole was the only damage to the door seal 8 months after the habanero coating was applied.

It is difficult to draw any conclusions from this test. Why did the chipmunks make so few new holes? Why were the two new holes both exit holes when all previous damage had begun with entrance holes? Was the coating applied less thoroughly to the inside of the door seals? Did the cool, damp weather on the day of application affect the coating or the adhesion of the coating to the seals? Controlled research tests would be needed to provide answers.

Rodents did no damage to the wiring and plastic cases of surveillance equipment that was protected by the coating, once law enforcement officers learned how best to apply the coating. An early formulation of the coating didn't adhere well to the plastic cases and wiring insulation. Because the equipment needed to be camouflaged anyway, wires and

boxes were wrapped with cloth camouflage tape before the coating was applied during final testing. This procedure seemed to work extremely well. Rodents did no damage to wires or boxes protected in this manner.

Applying the Product

In all tests, the elastomeric (flexible) sealant coating and the lanolin-based product were applied with a regular paintbrush. Care was taken to completely coat the surface, leaving no gaps in the coverage. The elastomeric coating had a slight orange color when applied, but the coating became clear after several weeks (figure 8). Surfaces treated with the elastomeric coating have a slight sheen, similar to the sheen of a semigloss paint finish. The lanolin product also seems to have a slight orange tint when applied, but the tint fades away within a few weeks. Unfinished wood surfaces that have been treated with the lanolin product have the appearance of oiled wood, but the surface is dry to the touch.

Although the Materials Safety Data Sheets for both the elastomeric and lanolin-based products show that the products contain no hazardous chemicals or poisons, the active ingredient (food-quality oleoresin capsicum) is an irritant. Care should be taken when applying and using the product.



Figure 8—Habanero coating was painted on the overhead door seals at the maintenance shop in the Mount St. Helens National Volcanic Monument. The freshly applied coating had an orange tint, but the coating became clear after several weeks.

Apply this product only in a very well-ventilated area, preferably outdoors. Use gloves, clothing, and eye and face protection. Make sure that an eye bath and safety shower are available. The product should be stored in a tightly closed container away from direct heat and oxidizing agents. Those who applied the coating reported no irritation when they painted it on, but some said their eyes watered when the brushes were cleaned. The brushes had a very strong pepper odor when they were being cleaned.

Conclusions

Based on the results of these brief, informal field tests, habanero coating could protect Forest Service buildings, signs, wiring, and fencing from damage by porcupines, horses, rodents, and possibly woodpeckers. Testing by other agencies, the New Mexico Institute of Mining and Technology, and the manufacturer suggests the coating also may be effective protection against termites, zebra mussels, saltwater organisms that attach to surfaces, rodents, snails, birds, and other small and large animals. More information is available at the Web site of the company that holds the patent, Ecocote International (<http://www.ecocote.com>), and at the New Mexico Institute of Mining and Technology, where the habanero bonding process was initially developed and patented (<http://infohost.nmt.edu/mainpage/news/2000/formosan.html>).

Obtaining the Product

Ecocote International has small quantities of the elastomeric sealant coating (ECS-1) and the lanolin-based product (ECT-Timberguard Plus) available for emergency orders. Large-scale harvesting of the peppers began in January 2005. The company has begun taking orders for regular delivery of the products in May 2005. The commercial price is expected to be about \$45 per gallon. This product is suitable for use on surfaces that can be painted with water-based paints.

The lanolin-based product will cost about \$50 per gallon. It is suitable for use on untreated or stained wooden surfaces. Orders can be submitted to Ed Hall at Ecocote International (edhall@ix.netcom.com). Include the term “Sealant” on the subject line. Orders can also be placed by telephone at 281-895-7999.

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About the Author

Kathleen Snodgrass came to MTDC as a project leader in 2001 from the Nez Perce National Forest, where she had been the facilities architect for about 7 years. Before becoming facilities architect, she had worked in facilities, landscape architecture, land line, and general engineering

for the Nez Perce National Forest. Kathleen also spent about 10 years working in highway design and construction with the Idaho Division of Highways after graduating from Washington State University in 1974 with a bachelor's degree in architectural studies.

Library Card

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Reports results of informal field tests of a new coating that deters animals from chewing or pecking treated surfaces. The active ingredient is food-grade oleoresin capsicum extracted from habanero peppers. The product is available as:

- An elastomeric (flexible) sealant coating for surfaces that can be painted with water-based paints
- A lanolin-based product for untreated or stained wooden surfaces.

Because the active ingredient is an irritant, the product should be used in extremely well-ventilated areas, preferably outside. Gloves, clothing, and eye and face protection should be worn when applying the product. Field tests showed that over periods ranging from 7 months to a year or so, porcupines and horses chewed the treated areas of wooden signs and softwood poles used as corral rails dramatically less than untreated areas. Woodpeckers appeared to peck less on the treated areas than on the untreated areas of a vault toilet's wooden siding. The New Mexico Institute of Mining and Technology developed and patented the process that molecularly bonds the habanero pepper extract to paints, stains, plastics, and other rubberized products. Ecocote International (<http://www.ecocote.com>) is selling the product.

Keywords: animal damage, bird repellents, Ecocote International, facilities, habanero, horses, irritant properties, irritants, paints, porcupines, repellents, rodent repellents, woodpeckers

Single copies of this document may be ordered from:

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Electronic copies of MTDC's documents are available on the Internet at:

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For additional information about coatings that discourage animals from damaging structures, contact Kathleen Snodgrass at MTDC.

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Forest Service and Bureau of Land Management employees can search a more complete collection of MTDC's documents, videos, and CDs on their internal computer networks at:

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