



Tree Tong Puts Whitebark Pine Cones Within Reach

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Whitebark pine, *Pinus albicaulis* Engelm., has seeds that are an important food source for wildlife such as grizzly bears, Clark's nutcrackers, and red squirrels. Not only are whitebark pines attractive trees, but they play an important role in watershed stabilization. This important high-elevation species found in Western forests is declining primarily because of the introduced white pine blister rust fungus, periodic outbreaks of mountain pine beetles, and fire suppression (Tomback and others 2001).

Testing Resistance to Blister Rust

Forest Service nurseries are selectively breeding genetically pure whitebark pines that show resistance to blister rust fungus (sometimes called "plus trees"). The U.S. Department of Agriculture Forest Service and the U.S. Department of the Interior National Park Service use wire mesh cages (figure 1) to protect the cones. The cones are collected and sent to Forest Service nurseries for testing to determine the tree's resistance to white pine blister rust.

A whitebark pine cone can have more than 50 seeds or as few as 9, depending on environmental conditions. Cones may have to be collected for 5 years from one tree to get enough seeds for testing. When the nursery has received enough seeds, workers germinate them and plant them in containers. The seedlings are inoculated with white pine blister rust fungus to determine their resistance. After 1 to 2 years, some seedlings may demonstrate a resistance to white pine blister rust. These results help identify or confirm disease-resistant parent trees.

Highlights...

- Whitebark pine cones are collected so nurseries can test trees for their resistance to white pine blister rust fungus.
- Ripening cones must be protected from birds and squirrels so the seeds can be used for selective breeding.
- It's difficult to install wire mesh cages over cones at the top of trees, where the cones grow.
- A tong used to clean gutters has been adapted to install and remove the wire mesh cages. The tree tong also is a good choice for plucking ripe cones from trees.



Figure 1—A Clark's nutcracker watches from a branch as a worker installs a wire mesh cage to protect whitebark pine cones so seeds can be used for selective breeding.



Cone Protection

Cones that will be collected are covered with hand-crafted wire mesh cages (figure 2) to protect them from Clark's nutcrackers and red squirrels. The cages are made using galvanized ¼-inch mesh, 23-gauge hardware cloth.

The Missoula Technology and Development Center (MTDC) was asked to investigate alternative materials to reduce the labor and expense of constructing and installing the wire mesh cages.

Field personnel had tried materials such as nylon mesh bags with a leno mesh liner (tough mesh used to cover backpack shoulder and waist straps), heavy aluminum foil, double-layered paper bags, and double and triple Vexar tubular mesh netting (commonly used to protect conifer seedlings). These alternatives failed because the Clark's nutcrackers found a way to get to the cones.

Alternative Methods

MTDC obtained two samples of a potent habanero pepper extract manufactured by EcoCote International. One sample consisted of pure habanero pepper extract (ECS-1) and the other was a lanolin-based product (ECT-Plus). These extracts have deterred animals from chewing on surfaces (Snodgrass 2005). A 2- to 3-percent pure habanero extract was mixed in an acrylic paint and painted on heavy-duty leno mesh that was used to protect the cones.

During the summer of 2005, the habanero products were tested at the Beaverhead-Deerlodge National Forest in Montana. Mesh cloth treated with ECS-1 was secured to clusters of cones and individual cones were painted with ECT-Plus using a foam paintbrush. The field crew reported a bumper crop of cones, but the Clark's nutcrackers didn't arrive in normal numbers. The nutcrackers left a lot of cones



Figure 2—Wire mesh cages are used to protect whitebark pine cones when their seeds will be used for selective breeding. The corner is folded at the bottom to keep the cage from blowing off and to keep red squirrels and Clark's nutcrackers from eating the seeds.

on the trees in 2005, including the cones treated with the lanolin-based product. Another field trial would be needed to determine whether this treatment is effective.

The majority of comments received from field personnel who struggle to protect whitebark pine cones revealed that many of their problems involved getting to the cones. Seed-bearing cones grow mostly on the ends of branches at the top of the tree crown, which may be 30 to 50 feet above the ground. In the past, certified tree climbers placed cages over the cones.

Climbers must ascend the tree, pull in the end of a cone-bearing branch without breaking it, slip the wire cage over the cones, and tie the end shut. Climbing always includes the risk that the climber may fall from the tree.

Field personnel often use a cherry-picker bucket truck to get into the tops of the trees. Renting a bucket truck and getting it to high-elevation locations presents its own challenges. Those challenges include:

- Finding suitable whitebark pines adjacent to a well-maintained road
- Finding a fairly level area to set up the truck
- Finding trees within a few hours drive from town

These challenges limit the number of trees that are available for cone collection.

The Tree Tong

The first use of a tree tong was at Crater Lake National Park in 2005. Segal Manufacturing makes the Gutter Sense rain gutter cleaning tool (figure 3), which has a tong that is opened and closed by pulling on a rope. The tong was threaded directly onto a retractable 18-foot paint pole. When the rope was pulled, the tong closed, gripping the wire mesh cage. The cage was then maneuvered into place and slipped over the cones. When the rope was let go, the tong opened, releasing the cage. Whitebark pine trees at Crater Lake grow about 30 feet tall, so the majority of cones could be protected using the tree tong (figure 4). The bottoms of the cages didn't need to be tied shut because Crater Lake doesn't have red squirrels, but the wind blew some of the cages off.



Figure 3—The Gutter Sense rain gutter tool can be used as a tree tong to pick whitebark pine cones.



Figure 4—The tree tong is released after a wire mesh cage was slipped over whitebark pine cones at Crater Lake National Park, OR.

Modifications to the Tree Tong

Whitebark pines in the Northwest United States can be up to 50 feet tall. MTDC used a sectional aluminum pole with 10-foot sections when working with the tree tong. A threaded adapter was attached to the top section (figure 5) to accept the tong. Plumber's tape helped tighten the connection between the adapter's threads and the tong's threads. A longer rope was tied onto the tong to accommodate the longer pole.

A rope cleat was added to the bottom section of the pole (figure 6) to hold the rope tight and keep the tong closed while the cage was being lifted into place.



Figure 5—A threaded adapter was attached to an extendable aluminum pole to accept the tree tong.

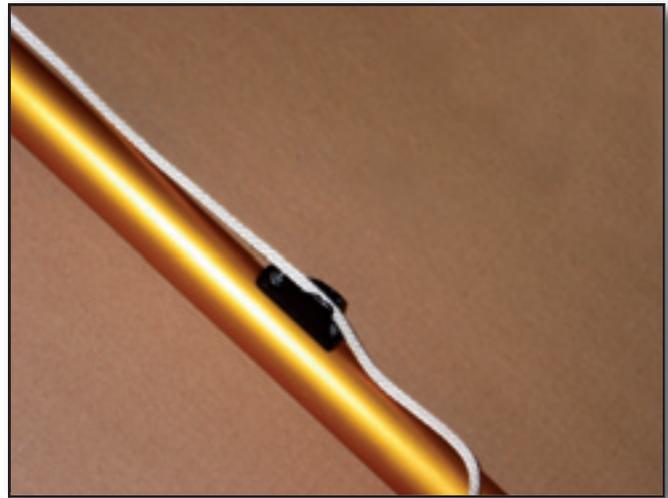


Figure 6—A rope cleat was attached to bottom section of the pole to hold the rope tight, keeping the tree tong closed.

The tong is made of hard plastic, which doesn't grip metal cages well. MTDC glued nonslip rubber shelf material to the tips of the tong to improve the grip (figure 7). We shortened the monofilament line on the tong to reduce the pull needed to close the tong.

When the pole was 30 feet long, it could be lifted into place and used effectively. When the pole was 40 feet long, it was awkward to lift and use. Table 1 shows a list of materials and suppliers for the tree tong's components and the habanero pepper extract used to protect cones.

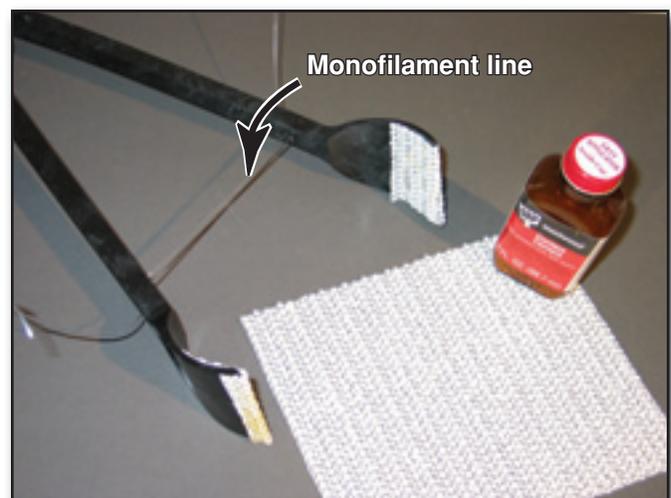
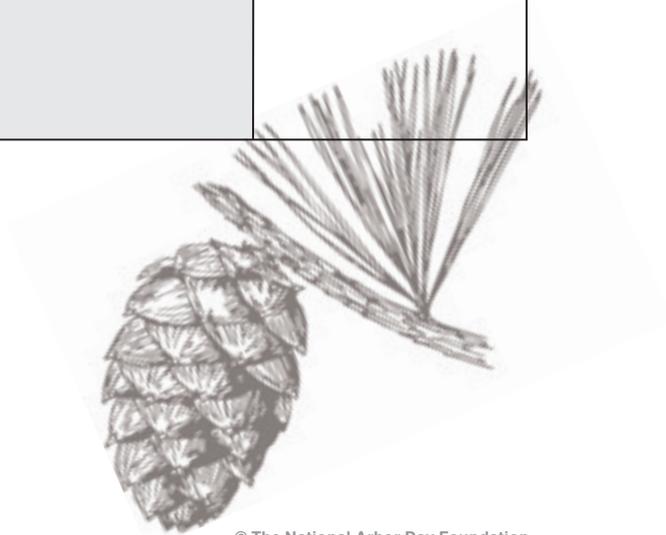


Figure 7—Nonslip rubber material was glued to the tips of the tree tong to help it grip the wire mesh cage. The monofilament line was shortened to reduce the pull needed to close the tree tong.

Table 1—Suppliers for tree tong components and the habenero pepper extract used to protect the cones.

Distributor	Item	Model number	Cost
Segal Manufacturing, Inc. P.O. Box 231 Fox River Gorge, IL 60021 847-639-1420 http://www.guttersense.com	Gutter Sense		\$19.95
Ben Meadows Co. P.O. Box 5277 Janesville, WI 53547 800-241-6401 http://www.benmeadows.com	Aluminum sectional pole	2JF-150528 aluminum 10 foot	\$49.90
McMaster-Carr Supply Co. P.O. Box 54960 Los Angeles, CA 90054 562-692-5911 http://www.mcmaster.com	Rope cleat	34915T42	\$3.89
American Standard Co. 157 Water St. Southington, CT 06489 800-275-3618 http://www.floriantools.com	Pole thread adapter	FTA-101	\$16.95
EcoCote International, Inc. 402 West San Antonio Ave. Boerne, TX 78006 281-895-7999 http://www.ecocote.com	Habenero pepper extract	ECS-1, ECT-Plus	\$50 per gallon



Results of Field Tests

Two national forests in Montana, the Lewis and Clark and the Beaverhead-Deerlodge, used the tree tong during the 2006 field season. Both forests reported that the extendable pole they used was manageable when it was extended between 20 and 30 feet. They wanted a way to close the ends of the wire mesh cages to keep red squirrels from raiding the cones and to keep the wind from blowing the cages off the branches.

MTDC developed a method to close the wire mesh cages using nylon cord and two cable locks (figure 8). This method was field tested on the Beaverhead-Deerlodge National Forest with limited success. Two tree tongs are needed: one to place the cage over the cones and hold it there, the other to pull the nylon cord to close the cage (figure 9). If the cage wasn't held with one tong while the other tong was used to pull the cord, cones were shaken from the branch. Even when two poles were used, this method did not do a good job of closing the cages.

The Beaverhead-Deerlodge National Forest manufactured a hook that attaches to the end of the pole. The hook allowed workers to fold the bottom corners of the wire mesh cage shut, but they often broke the branch or shook the cones off when doing so. Although the hook may not be useful from the ground, perhaps tree climbers might be able to use the hook to pull a branch toward them.



Figure 8—Nylon cord with two cable locks was used to close the bottom of the wire mesh cage.



Figure 9—Beaverhead-Deerlodge National Forest employees use two tree tongs to install a wire mesh cage and pull the nylon cord to close the cage.

Conclusions

The tree tong is a portable, efficient tool for installing wire mesh cages to protect whitebark pine cones. Unfortunately, there's no easy way to close the end of the wire mesh cages after they're installed.

In areas where trees are shorter than about 30 feet and where squirrels and high winds are not a problem, the tree tong could be used to install and remove wire mesh cages on whitebark pine trees. The tree tong also is a good choice for plucking ripe cones from trees.

Future studies could determine whether painting (or spraying) habanero extract on the cones deters nutcrackers and squirrels. If so, it's possible that the cones could be painted with habanero extract using a brush or spray device mounted on a pole. The tree tong could be used to remove the cones after they are ripe.

References

Snodgrass, Kathleen. 2005. Quit eating my signs! Pepper-based coating discourages animals from damaging structures. Tech Tip 0573–2313–MTDC. Missoula, MT: U.S. Department of Agriculture Forest Service, Missoula Technology and Development Center. 6 p.

Tomback, D.F.; Arno, S.F.; Keane, R.E. 2001. Whitebark pine communities: ecology and restoration. Washington, DC: Island Press. 440 p.

Acknowledgments

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About the Authors

Mary Ann Davies received a bachelor's degree in mechanical engineering with a minor in industrial and management engineering from Montana State University. She worked in the Pacific Northwest Region as a facility and tramway engineer. Mary Ann has worked in fire management as a crewmember and as a crewboss. She worked for 5 years with the Rocky Mountain Research Station in the fire chemistry and fire behavior groups before coming to MTDC in 1999.

Michael Murray is a terrestrial ecologist at Crater Lake National Park, OR. He studied Rocky Mountain whitebark pine fire and landscape ecology for his Ph.D. at the University of Idaho. He has published a variety of scientific articles on whitebark pine, has supervised mapping of an extensive bark beetle epidemic in Alaska, and has worked as an environmental educator for fifth and sixth graders, and as a college instructor. He successfully established whitebark pine guidelines in the general management plan for Crater Lake National Park where he works to improve methods for restoration, enhance understanding, and promote the whitebark pine's cause to a broad audience.



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Nurseries are breeding whitebark pine trees that show resistance to white pine blister rust. Seeds have to be collected from trees that show resistance before the nurseries can begin their tests. If the cones are not protected, birds such as the Clark's nutcracker and red squirrels will eat the seeds. Wire cages can protect the cones, but it's difficult to install the cages on the ends of branches at the top of the tree where the cones grow. A tong used to clean gutters was adapted to install the wire cages over cones on trees up to 30 feet tall. A hook was developed to close the cages. The tong offered distinct advantages over having certified tree climbers or using a bucket trucks, but didn't completely solve the problem of installing wire cages to protect the cones.

Keywords: Clark's nutcracker, equipment development, grizzly bears, nurseries, red squirrels, reforestation

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