

Nontimber Forest Products for Small Woodland Owners: Reishi Mushroom Growing Guide

Nontimber Forest Products for Small Woodlands

Bashira Muhammad, Tiffany Hopkins and Maud Powell

Red reishi, *Ganoderma lucidum*, has been revered for thousands of years in China and used in Asian countries where it is said to improve health and longevity. The common names used to describe the species come from China (“lingzhi”) and Japan (“reishi”). Reishi mushrooms make up a diverse genus and have a broad geographic range from South America to Asia.

Different species have different growing requirements. Some prefer tropical, subtropical or temperate climates with plenty of deciduous hardwoods. Some prefer coniferous ecosystems.



Reishi mushrooms.

Credit: Bashira Muhammad

Ganoderma applanatum, *Ganoderma tsugae* and *Ganoderma oregonense* can be found in the forests of Oregon, standing out in winter due to their corky or woody texture.

Ganoderma lucidum is considered to be an adaptogen — meaning that it may help regulate the body's stress response. For this reason, it is in high economic demand.

Reishi form and structure

Genus *Ganoderma* is made up of bracket or shelf fungi with or without stipes (stems or stalks). These include the grayish-brown *G. applanatum*, which reaches up to 30 inches wide, 40 inches long and 4 inches thick.

In this publication, red reishi refers to *Ganoderma lucidum*, the variety most commonly cultivated due to its adaptogenic properties. *Ganoderma lucidum* means "shining skin" in Latin, although the Oregon varieties are not typically as shiny as most other species. *G. lucidum* is bright red at maturity but ranges from white to yellow as it grows.

Red reishi can appear as "finger-like antlers" or form a "shelf," depending on the amount of oxygen in the environment.



Tall reishi "pins" growing outdoors.

Credit: Bashira Muhammad



Reishi growing in its natural habitat.

Credit: Bashira Muhammad

How to cultivate your own reishi mushrooms

Option A: Growing reishi with a fruiting block

Fruiting blocks can be purchased from local suppliers and mimic natural logs in structure and function. They start as 5-pound blocks made with hardwood sawdust and bran, which get sterilized and then inoculated with grain spawn. To prepare your space for planting the fruiting blocks, blend the surrounding substrate with sawdust (to increase moisture-holding capacity) or wood chips (to increase water percolation).

Timeline

The time from the start of the spawn run to complete colonization is about 20 days. Then, the mushroom begins forming “finger-like” antler growth, which takes about 28 days. After the antlers reach 1–3 inches, the fruiting blocks are ready for use and planting. You’ll need to remove the sawdust blocks from their bags and plant them in the ground. Plant them deeply enough to keep them from floating in pooling water. From here, the classic presentation of reishi — a shelf fungus — will form over the next 75–90 days. After this initial flush, you can expect a second one over the next 75–90 days if the growing season is long enough.

Growing environment

You can grow reishi in a greenhouse, on the forest floor, or in a makeshift shady and humid environment. Greenhouse production requires more upfront costs than outdoor operations, but mushrooms reach maturity more quickly in a greenhouse.

Cover the greenhouse with 70%–75% shade cloth. Oxygen needs will vary depending on what phase of growth you’re in.

Option B: Inoculating logs with sawdust spawn

The traditional methods of growing red reishi mushrooms involve inoculating logs with spores and “immature” or “fresh” sawdust spawn, incubating those logs for the nine- to 12-month spawn run, and then planting those logs in the grounds of a shaded greenhouse in early spring. “Immature” in this context means working with the mycelium while it is young and before it has a chance to harden to the conky, woody, leathery texture characteristic of the mature shelf fungus.

No matter the substrate, reishi is slower to form mature mushrooms than cultivars such as shiitake, oyster and lion's mane.

Risks and rewards

The main benefit of log culture is that it generally produces higher quality mushrooms than sawdust-based fruiting blocks. You can expect two flushes over the growing season.

Log culture

STEP 1: SUBSTRATE PREPARATIONS (WOOD HARVEST AND PROCESSING)

Tree selection: Select a healthy and relatively straight-limbed oak or maple. Fell the selected tree in the fall or winter, after leaves have browned or fallen off, when sugar and moisture content is higher in the wood.

Use wood at least two days after felling, when the tree's natural defense mechanisms will have settled down. Inoculate the logs within 30 days to ensure high moisture content and decrease the chance of other fungi inoculating the log.

Length: 2- to 4-foot lengths

Diameter: 4–7 inches

STEP 2: LOG INOCULATION WITH SAWDUST SPAWN

Get started with inoculation by drilling holes into your host log. You may need to scrape moss from the log first to make drilling easier; be careful not to damage the bark. Drill holes 1 inch deep using a 12 mm drill bit. Begin drilling 1 inch from the edge of the log. Leave 2–3 inches between rows and 3–6 inches between holes in a row. This will create a staggered diamond pattern that allows the mycelium to spread along the grain of the wood.

Spray water into each hole if moisture content is a concern at the time of inoculation. Insert sawdust spawn using a palm tool according to the manufacturer's suggestions. Continue until each hole is full of sawdust spawn.

Finally, cover each inoculated hole with food-grade wax to prevent the spawn from being eaten by wildlife or contaminated by other fungi.

STEP 3: INCUBATION FOR THE SPAWN RUN

Over the next nine to 18 months, mycelium will engulf the logs from the inside. During this incubation time (which begins immediately after inoculation), store the logs in the warmth and humidity of the greenhouse and off the ground on clean pallets. Moisture maintenance is critical, especially in noncoastal Oregon summers. Too much moisture can harbor bacterial growth, but too little moisture won't support spawn. Logs should always have a healthy weight to them, which will indicate adequate moisture content. Water them briefly once or twice a day, depending on your microclimate. Once the mycelia start to appear at the face end of each side of the log, the spawn run is complete. It is time to plant the logs in greenhouse trenches. Base the trench dimensions on your production goals and the quantity of available inoculum. Dig deeply enough cover blocks completely with a couple of inches of soil.

STEP 4: MUSHROOM MATURATION

Fully developed mushrooms will be ready to harvest about three months after pinning begins (when the primordia form). Reishi are ready when the margin of the cap turns from white to red. To harvest reishi, twist or cut at the base of the stem. They are corky and tough, so be aware when cutting the first few times. Natural logs and fruiting blocks can produce mushrooms twice a growing season (generally between April and August). Typically, yields last one year for every 1 inch in diameter of the host log. For example, a log with a 6-inch diameter will bear fruit for about six years. The tradeoff with the larger log diameter is the longer colonization time — and a longer wait until the first harvest.

About the authors



Bashira Muhammad



[Tiffany Hopkins](https://extension.oregonstate.edu/people/tiffany-hopkins) (<https://extension.oregonstate.edu/people/tiffany-hopkins>)

(Former)



[Maud Powell](https://extension.oregonstate.edu/people/maud-powell) (<https://extension.oregonstate.edu/people/maud-powell>)

Small Farms

© 2022 Oregon State University. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties. Oregon State University Extension Service offers educational programs, activities, and materials without discrimination on the basis of race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, familial/parental status, income derived from a public assistance program, political beliefs, genetic information, veteran's status, reprisal or retaliation for prior civil rights activity. (Not all prohibited bases apply to all programs.)

Accessibility: This publication will be made available in an accessible alternative format upon request. Please contact puborders@oregonstate.edu or 1-800-561-6719.