

why mushrooms?

Mushrooms are an environmentally friendly specialty crop that do more than produce food—they help build healthier soil. Spent mushroom substrate (SMS) provides organic matter, nutrients, and beneficial fungi that improve soil structure, increase water retention, and support long-term soil fertility, making it an effective tool for sustainable agriculture.

what is spent mushroom substrate (SMS)?

Spent Mushroom Substrate (SMS) is the nutrient-rich growing medium left after mushrooms have finished producing. Though no longer suitable for indoor cultivation, it can improve soil health and support outdoor growing.

why it works:

Fungi break down organic matter into nutrients that helps to maintain soil fertility. Fungi produce a network of filaments called hyphae that can help to bind soil particles together, creating stable soil aggregates. This improves soil structure, increases soil porosity and permeability, while enhancing water and nutrient retention.

Research Highlights:

Spent mushroom substrate (SMS) produced the highest early yields and maintained stable production into the second year.

Pairing SMS with oat and brassica cover crops improved moisture retention, moderated soil temperature, and supported sustainable mushroom production.

Annual soil testing is recommended to monitor phosphorus, potassium, and pH levels.

Stropharia rugosoannulata performed well in outdoor raised beds in South Dakota.

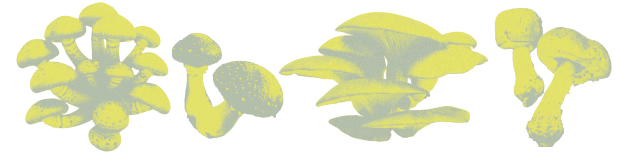


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or want to learn more?*

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the Fungi Frontier:

*Advancing Sustainable Agriculture
Through Innovative Mushroom Production
and Soil Building in South Dakota*

BY BLACK HILLS
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1. Prep



Prepare a raised garden bed with quality soil.

2. Sample



Collect soil samples for lab testing. Lab testing should include pH and nutrient levels. Record any other tests performed without a certified lab.

3. Cold-Shock



Cold-shock mushroom spawn for two weeks in your fridge or a cold space (maintain a temperature of 38-42°F). This sudden temperature drop mimics a seasonal change, tricking the mycelium into shifting from growth mode to producing fruiting bodies.

4. Mix



Add spawn into moist (but not saturated) soil. at a 1:4 spawn-to-soil ratio. Mix thoroughly.

5. Plant



Plant shade/cover crop to the soil and spawn mixture. This will help retain moisture and provide nutrients for the mushrooms.

6. Water



Water the soil and cover crops using an irrigation system. The soil should be moist, but not too wet. Well water, municipal water, and surface water should be tested for any heavy metals or other contaminants.

7. Monitor



Monitor the soil regularly while the mushrooms get established. Ensure the soil remains moist and add water if necessary.

8. Harvest!



Harvest mature mushrooms by twisting and pulling them from the substrate or cutting them at the base, depending on the species. Record yields after each harvest.

9. Pest Management



Manage pests using organic methods, if any issues arise (e.g., sticky fly traps, beneficial nematodes, etc.)

10. Rotate Crops



Rotate crops to maintain long-term soil health. Balance low- and high-residue crops based on local conditions, equipment, and workload for optimal soil health.