

Rainbow Mushrooms: A Spectrum of Nutrition and Sustainability

Rainbow mushroom farming is an innovative and sustainable approach to mushroom cultivation that involves growing a diverse array of naturally pigmented edible fungi. This method enhances biodiversity, promotes eco-friendly agricultural practices, and provides high-value nutritional and medicinal benefits. Various species, including golden-yellow, pink, blue, green, red, brown, and white edible mushrooms, are cultivated for their unique flavours, textures, and bioactive compounds. Rich in proteins, antioxidants, and essential vitamins, these mushrooms enhance immunity, aid digestion, and support cardiovascular health. The economic potential of rainbow mushrooms is substantial, as their exotic appearance and nutritional superiority drive high market demand, especially in health-conscious markets.

MUSHROOM farming has long been recognized as a sustainable and profitable agricultural venture. However, a new approach is gaining attention in the mushroom industry: Rainbow Mushroom Farming. This vibrant method involves cultivating multiple edible mushroom species in a variety of colours, offering both aesthetic appeal and exceptional nutritional benefits. From golden-yellow and pink oyster to deep blue and red fungi, these mushrooms are not only visually striking but also packed with health-boosting properties.

What is rainbow mushroom farming?

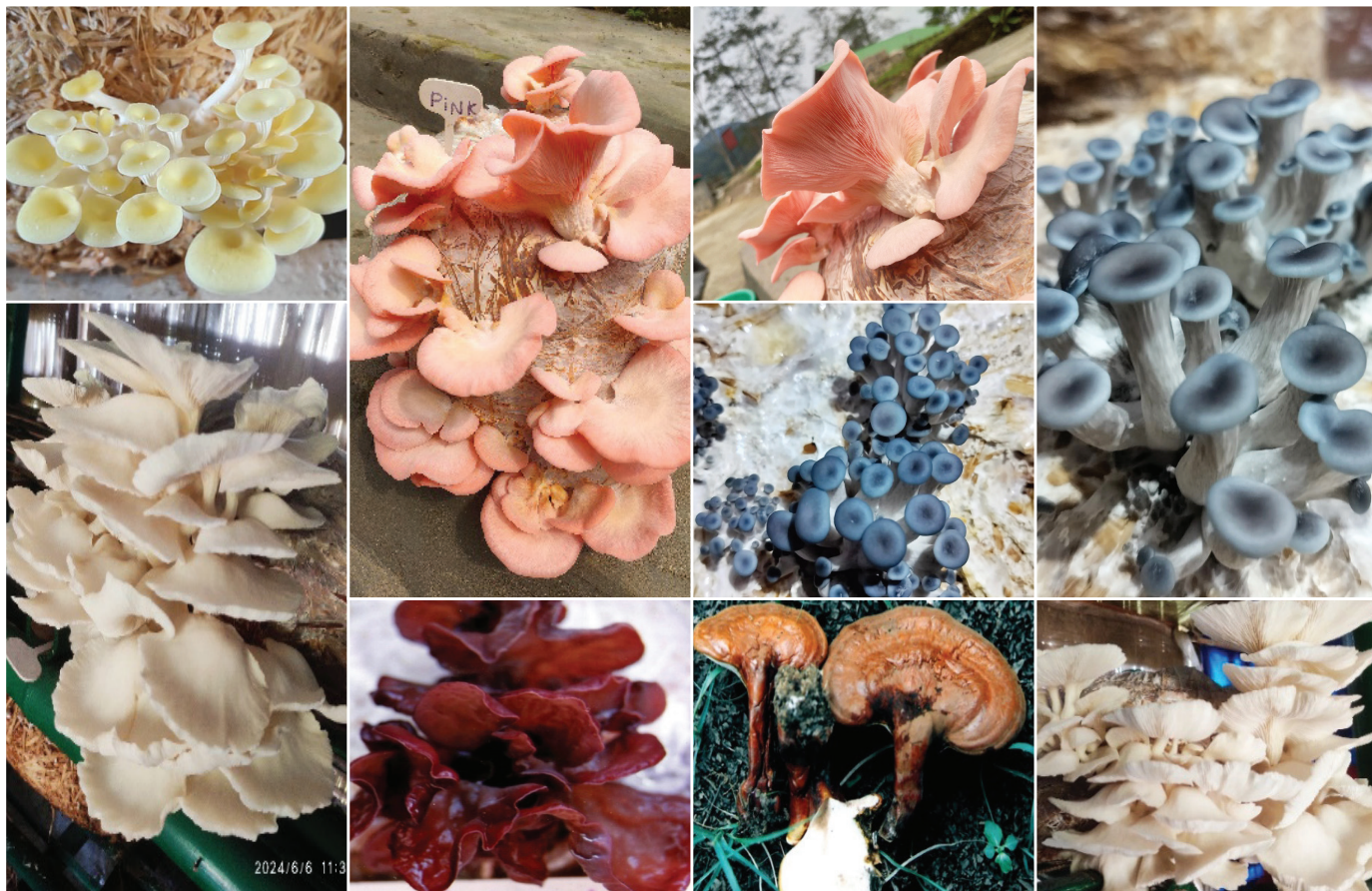
Rainbow mushroom farming refers to the cultivation of various naturally pigmented mushrooms, each possessing unique flavours, textures, and medicinal properties. This includes:

- **White oyster (*Pleurotus florida*):** The most widely consumed mushroom, offering a mild flavour and a rich source of essential nutrients.
- **Golden-yellow oyster (*Pleurotus citrinopileatus*):** A bright yellow mushroom with a delicate, nutty flavour and excellent antioxidant properties.
- **Pink oyster (*Pleurotus djamor*):** A vibrant pink mushroom with a slightly meaty taste, ideal for stir-fries and sautés.
- **Blue oyster (*Pleurotus ostreatus* var. *columbinus*):** Known for its rich umami flavour and high protein content.
- **Green Russula (*Russula virescens*):** A gourmet green-capped mushroom with a nutty, mild flavour.
- **Red Reishi mushroom (*Ganoderma lucidum*):** A medicinal mushroom with adaptogenic properties, commonly used in teas and health supplements.
- **Brown/wood ear mushroom (*Auricularia polytricha*):** A dark brown, elegant mushroom with a robust texture and high fiber content.

Table 1. Nutritional comparison of rainbow mushrooms

Mushroom Type	Protein (%)*	Fiber (%)*	Antioxidants	Key Benefits
White oyster	20-32	8-14	Moderate	Support bone health, immune-boosting
Golden-yellow	18-28	6-12	High	Immune-boosting, anti-inflammatory
Pink oyster	18-26	7-12	Moderate	Rich in vitamins B and D, heart health
Blue oyster	20-30	8-16	Very High	Brain function, cholesterol regulation
Green Russula	15-20	8-15	Moderate	Good for digestion, mild detoxifier
Red Reishi	8-14	15-25	Very High	Adaptogenic properties, supports immune system
Auricularia polytricha	10-18	30-40	Very High	High in fiber, promotes gut health, cholesterol-lowering

*Nutritional content can vary based on growing conditions, preparation methods, and specific mushroom strains



Different edible mushrooms, golden-yellow, pink, blue, brown (*Auricularia polytricha*), red (*Ganoderma lucidum*) and white oyster.

Why choose rainbow mushroom farming?

- **Nutritional and medicinal superiority:** Each colour in the spectrum represents different health benefits. Rich in proteins, vitamins, and bioactive compounds, rainbow mushrooms contribute to improved immunity, heart health, and brain function.
- **High market demand and premium pricing:** The exotic appearance of these mushrooms makes them highly desirable in restaurants, organic markets, and the health food industry. Their unique appeal often commands a higher price than conventional varieties.
- **Sustainable and eco-friendly farming:** Rainbow mushrooms thrive on agricultural waste such as paddy straw, wheat straw, and sawdust, making their cultivation a sustainable and zero-waste farming approach.
- **Diverse culinary applications:** From soups and pickles to medicinal teas and health supplements, rainbow mushrooms cater to a broad range of culinary and nutraceutical markets.

How to cultivate rainbow mushrooms

- **Selecting the right mushroom species:** Before starting, farmers should choose species that are best suited to their local climate and market demand.
 - **Warm-climate (20–30°C):** Pink oyster, Golden-yellow oyster, and Wood ear (*Auricularia polytricha*)
 - **Cool-climate (10–20°C):** Blue oyster, Green Russula, and White oyster

- **Choosing the right substrate:** Mushrooms grow on organic waste materials called substrates, which provide essential nutrients for their growth. Different mushrooms prefer specific substrates:

Mushroom Type	Preferred Substrate
White, Blue, Pink & Golden-yellow	Paddy straw and Wheat straw
Auricularia	Sawdust
Green Russula	Sawdust
Red Reishi	Sawdust

- **Spawning and incubation:** Spawning refers to mixing mushroom seed (spawn) with the substrate.
- **Preparing spawn bags:** Fill sterilized plastic bags or containers with pasteurized substrate. Mix 3-5% mushroom spawn evenly into the substrate.
- **Incubation conditions:** Maintain optimal temperature. Keep the inoculated bags at 80–90% humidity to allow proper colonization, which typically takes 10–20 days.
- **Fruiting conditions:** After full colonization, move bags to a cropping room.
- **Harvesting and post-harvest management:** Mushrooms should be harvested at peak maturity to ensure optimal flavour and texture.
- **Economic analysis and market Opportunities:** The demand for coloured mushrooms is increasing

Table 2. Humidity and light requirements of mushroom

Mushroom type	Temp. (°C)	Humidity (%)	Light requirement
White oyster	20-25	85-95	Low
Pink oyster	24-30	85-95	Medium
Golden-yellow	18-25	85-95	Medium
Blue oyster	10-18	85-95	High
Green Russula	15-25	80-90	Medium
Red Reishi	25-30	80-90	Indirect Light
Auricularia	22-28	80-90	Low

Table 3. Cost-benefit analysis of rainbow mushroom farming

Mushroom Type	Yield (kg/100 kg substrate)	Cost of Production (₹/kg)	Market Price (₹/kg)	Net Profit (₹/kg)	Cost-Benefit Ratio (CBR)
White oyster	99	100	450	350	1:3.5
Golden oyster	70	100	450	350	1:3.5
Pink oyster	89	100	420	320	1:3.2
Blue oyster	87	100	450	350	1:3.5
Green Russula	65	140	450	310	1:2.2
Red Reishi	50	180	1100	920	1:5.1
<i>Auricularia polytricha</i>	65	110	420	310	1:2.8

in high-end culinary markets, wellness industries, and organic stores. Farmers can generate profits through fresh mushroom sales or by expanding into value-added products such as dried mushrooms, teas, seasonings, and dietary supplements.

CONCLUSION

Rainbow mushroom farming is an innovative, sustainable, and highly profitable venture that combines visual appeal with outstanding health benefits. With minimal investment and eco-friendly practices, cultivating these colourful fungi opens new opportunities for farmers,

entrepreneurs, and health-conscious consumers. As awareness grows, the future of rainbow mushroom farming shines brighter than ever!

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In mushrooms, three strains were identified. In button mushroom, strain A-63 performed best with 14.01% yield increase over control and was released for commercial cultivation. The strains of *V. volvacea*, Vv-05-19 (DMRO 1213) was released with overall average biological efficiency of 15.85 kg/100 kg of dry substrates. Based on multilocation trial, the milky mushroom strain CI-22-204 was released with overall average biological efficiency of 67.26 kg per 100 kg dry substrate.



A-63 strain in fruiting



Volvariella volvacea
Vv-05-19 in fruiting



Milky mushroom strain
CI-01 in fruiting

Source: ICAR Annual Report 2023-24, p.43