International Journal of Environment, Agriculture and Biotechnology
Vol-10, Issue-4; Jul-Aug, 2025
Peer-Reviewed International Journal
Journal Home Page Available: https://ijeab.com/
Journal DOI: 10.22161/ijeab

Comparative Evaluation of Cultural, Morphological and Nutritional Characterization of Different Strains of *Calocybe indica*

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Received: 07 Jun 2025; Received in revised form: 5 Jul 2025; Accepted: 12 Jul 2025; Available online: 19 Jul 2025

Abstract— *The study assessed six stains of Calocybe indica (CI-24-201, CI-24-202, CI-24-203, CI-24-204, CI-24-205 and CI-24-206) for mycelial growth, morphological traits and nutritional composition. Significant interspecific variation was observed across media types, with CI-24-205 exhibited the fastest colonization and early pinning and showing the highest yield and biological efficiency. Morphological traits varied distinctly among strains. Nutritionally, CI-24-203 had the highest protein, CI-24-206 had the highest ash, CI-24-201 showed maximum carbohydrate and CI-24-202 showed maximum moisture levels. The findings identify CI-24-205 as promising strain for commercial cultivation.*

Keywords— ***Mushroom, Calocybe indica, Milky, Nutrition and Biological Efficiency***

I. INTRODUCTION

The word "mushroom" originates from the Gallo-Roman term *mussirio*, referring to macro-fungi with fleshy fruiting bodies. Belonging to the division *Basidiomycota*, mushrooms include saprophytic, mycorrhizal and parasitic fungi. Their vegetative structure consists of thread-like hyphae (mycelium), which under favourable conditions produce visible fruiting bodies, either above (epigenous) or below (hypogenous) ground (Chang and Miles, 1992).

Calocybe indica, commonly known as the milky mushroom (also known as the milky mushroom/summer mushroom or dudh chatta, as it is a good-yielding mushroom even in the summer season) in India, is a member of the Kingdom – Fungi, Phylum – Basidiomycota, Class - Agaricomycetes, Order- Agaricales, Family – Tricholomataceae, Genus – *Calocybe* and Species – indica. (Alexopolous *et al.*, 1996).

This mushroom was first reported from West Bengal, India, by Purakayasha and Chandra in 1974. *Calocybe indica* generally grows on substrate rich in organic material in tropical regions. This mushroom blooms well between the months of April and September. It is primarily cultivated in India, as it grows well at higher temperatures. This mushroom requires a temperature range of about 25-35°C and a relative humidity of 80-90%. As the fungus has an effective system for the lignocellulosic substrate degradation, it can be cultivated on varieties of cellulosic substrates like wheat straw, paddy straw, sorghum stalks, pearl millet stalks, maize stalks, sugarcane bagasse, sugarcane trace, soybean straw, cotton waste, coconut coir pith, groundnut haulms, etc. (Patel and Trivedi, 2016).

Its consumption in Western countries is 75% of total world production, *viz.,* USA 30%, Germany 17%, UK 11%, Italy 10%, Canada 6% and the remaining 15% by the rest of the world. These countries offer good marketing for mushrooms. During 2022, per capita consumption of mushrooms in India was hardly 180-200 g as compared to 3 to 4 kg in developed countries (Kumar *et al.*, 2022).

In India, annual mushroom production is approximately 2.69 lakh tonnes, with Bihar (11.3%) being the leading producer, followed by Odisha (10.2%) and Maharashtra (9.3%) (ICAR-DMR, 2023–24). button mushrooms contribute around 73% of total production followed by white Oyster mushrooms (16%), paddy straw (7%) and milky mushrooms (4%). India exported 105.4 tonnes of processed button mushrooms in 2016–17, earning ₹7,282.26 lakh (Sharma *et al*., 2017).

C. indica is a good source of protein, lipids, fiber, carbohydrates, vitamins and contains a plentiful amount of essential amino acids (Alam *et al.*, 2008). The mature fruit body of *C. indica* contains the highest protein (17.2% on a dry weight basis), while young pinheads contain the lowest protein (15% on a dry weight basis), 4.1% fat, 3.4% crude fiber, 64.26% carbohydrates and eleven amino acids. Milky mushrooms contain 17.69% protein, 4.1% fat, 3.4% crude fiber and 64.26% carbohydrates; mature sporocarps contain 4% soluble sugars, 2.9% starch and 7.43% ash (Kumar et al. 2017).

II. METHODOLOGY

This experiment was conducted to evaluate the cultural, morphological characteristics and nutritional analysis of six different strains of *Calocybe indica* and to identify the most vigorous strains under varying cultivation conditions. The selected species were cultivated from December to May 2025 for comparative assessment.

Six strains were taken for this investigation as follows:

CI-24-201

CI-24-202

CI-24-203

CI-24-204

CI-24-205

CI-24-206

Studies on cultural characterization of *Pleurotus* species

The mycelial growth patterns of six strains of *Calocybe indica* were studied on two different solid media to determine their suitability for supporting mycelial development. The media were sterilized at 121.6°C under 15 psi pressure for 20 minutes. Subsequently, 20 ml of each medium was poured into 90 mm diameter Petri dishes. These plates were inoculated with 5 mm discs cut from 15-day-old cultures of *Calocybe indica* using a sterilized cork borer and incubated at 25°C.

The experimental design followed a Completely Randomized Design (CRD) with four replications each treatment. Radial mycelial growth was measured by taking the average of two perpendicular diameters of the colony and subtracting the initial 5 mm disc. Data on mycelial growth were statistically analyzed. Observations continued until any one treatment reached full Petri plate coverage.

The preparation of solid media whose composition is given below were taken for *in vitro* studies.

Composition of different media:

S. No.	Medium	Constituents	Quantity
1.	Malt Extract Agar	Malt extract Agar-agar Distilled water pH	20 g 20 g 1000 ml 7.0
2.	Potato Dextrose Agar	Peeled potato Dextrose Agar-agar Distilled water pH	200.00 g 20.00 g 20.00 g 1000 ml 7.0

Preparation of media: The media were prepared following standard protocols. For Potato Dextrose Agar (PDA), 500 ml of water was taken in a 1-litre beaker and 200 g of peeled and sliced potatoes were added. For Malt Extract Agar (MEA), 20 g of malt extract was used in place of potato. The contents were gently boiled for about 20 minutes or until the potatoes could be easily pierced with a glass rod. The extract was then filtered through muslin cloth, squeezing out all the liquid. Then add 20 g dextrose (in the case of PDA only) and 20 g of agar-agar were added to the filtrate. The volume was adjusted to 1000 ml using distilled water. The medium was dispensed into 200 ml portions in conical flasks and sterilized in an autoclave before use.

Studies on morphological characterization of *Calocybe indicaq*

The morphological characterization of the six strains of *Calocybe indica* were assessed by cultivating them on wheat straw substrate during December to May, 2025. The experiment was laid out in a Completely Randomized Design (CRD) comprising six different strains of *Calocybe indica* as treatments, each replicated four times using four cultivation bags per replication. Wheat straw served as the cultivation substrate, with each bag containing 4 kg of wet substrate. Standard cultivation bags of size 45 x 30 inches were used for mushroom production.

Chemical sterilization by application of formalin (2%) was carried out by treating the casing material placed on a

plastic sheet treating with solution 2% formalin (50 ml/liter of water). Formalin was sprinkled in layers till saturation and then covered with another plastic sheet. The casing material was turned after 24 hours and then again covered tightly with plastic sheeting. After 48 hours it was uncovered and stirred frequently to remove the traces of formalin fumes. The treated material was then stored in a nylon bag and used 2 days after the treatment.

The following observations were recorded during the experiment to evaluate the performance of different strains of *Calocybe indica*: days taken for spawn run completion, days taken for pinhead initiation, days taken 1st harvest after casing and the number of fruiting bodies per bag. Morphological characteristics of fruiting bodies were also assessed, including pileus features such as surface texture, size, shape, colour/pigmentation and margin type. Stipe characteristics and its mode of attachment were also noted. Additionally, the average weight per fruiting body, detailed fruit body measurements and total yield were recorded to calculate the Biological Efficiency (BE) of each treatment. The biological efficiency was also calculated by following the formula (Chang, 1981).

$$\text{Biological Efficiency (\%)} = \frac{\text{Fresh fruiting bodies (g)}}{\text{Dry weight of substrate (g)}} \times 100$$

Nutritional analysis of different strains of *Calocybe indica*

The nutritional composition of six strains of *Calocybe indica* (CI-24-201, CI-24-202, CI-24-203, CI-24-204, CI-24-205 and CI-24-206) were analyzed to compare key quality parameters of the fruiting bodies cultivated under ambient conditions. The study also aimed to examine the relationship between nutritional content and the basal substrate, wheat straw. The experiment was laid out in a Completely Randomized Design (CRD), consisting of six treatments (strains) with four replications each.

The following nutritional parameters were assayed to evaluate the quality of different strains of *Calocybe indica*: total moisture content, total protein content, total carbohydrate content and total ash content. These analyses provided insights into the nutritional composition and potential dietary value of the cultivated mushrooms.

The methods and protocols to achieve the above ones are as follows:

Moisture content: Moisture percentage was determined by sun-drying the freshly harvested mushroom samples and calculating the difference between their fresh and dry weights using the standard formula:

$$\text{Moisture percent} = \frac{\textit{Initial weight of mushroom}(g) - \textit{Dried weight of mushroo}}{\text{Initial weight of mushroom(g)}} \times 100$$

Estimation of Protein: Protein content was estimated using the Biuret method as described by Burtis and Ashwood (2006).

Reagents: Protein Standard; 5 mg/ml of purified protein (e.g., BSA or Casein), Biuret Reagent; Prepared by dissolving 3 g $CuSO_4$ and 9 g sodium potassium tartrate in 500 ml of 0.2 N NaOH, followed by the addition of 5 g KI and making up the volume to 1 litre with 0.2 N NaOH.

Procedure: Five grams of finely grinded mushroom tissue were boiled in 50 ml of 1 N NaOH for 30 minutes. After cooling to room temperature, the mixture was centrifuged at 1000 × g by a table centrifuge machine. The supernatant was collected and analyzed for protein content using the Biuret method.

Determination of Carbohydrate: Total carbohydrates were estimated using the Anthrone method.

Reagents: Anthrone Reagent; 200 mg anthrone dissolved in 100 ml ice-cold concentrated H_2SO_4, Standard Glucose Solution; Prepared by dissolving 100 mg glucose in 100 ml distilled water (stock) and further diluting 10 ml of stock to 100 ml to make the working standard.

Procedure: Aliquots of 0.21 ml from the working glucose standard were taken in five test tubes, diluted to 1 ml with distilled water and 5 ml anthrone reagent was added to each. After mixing, the tubes were heated in a water bath for 10 minutes, cooled and absorbance was recorded at 630 nm. A blank (distilled water + reagent) was also prepared. A standard curve was used to determine sugar concentrations in the samples.

Determination of Ash

One gram of the sample was weighted accurately into a crucible. The crucible was placed on a clay pipe triangle and heated first over a low flame till all the material was completely charred, followed by heating in a muffle furnace for about 6 hours at 600°C. It was then cooled in a desiccator and weighed. Then total ash was calculated as following equation (Raghurmalu *et al. 2003)*:

$$\textbf{Ash (\%)} = \frac{\text{Total weight of ash}}{\text{Weight of sample taken}} \times 100$$

III. RESULTS AND DISCUSSION

Cultural characterization of different strains of *Calocybe indica*

The growth characteristics of six stains of *Calocybe indica* were evaluated on two culture media: Potato Dextrose Agar (PDA) and Malt Extract Agar (MEA). The results are presented in Table 1, Fig 1. and Plate 2. The strains showed considerable variation in terms of radial mycelial growth, nature of the mycelium and growth rate. Among the tested strains, CI-24-202 exhibited the maximum mycelial growth of 80.53 mm on PDA and 75.80 MEA. Its mycelium appeared white and demonstrated a fast growth rate. CI-24- 201 also recorded high radial growth, 73.30 mm on PDA and 68.60 mm on MEA. Strain CI-24-203 demonstrated mycelial growth of 64.56 mm on PDA and 62.30 mm on MEA. The mycelium appeared pure white and initially fluffy. Strain CI-24-205 also recorded mycelial growth, 57.86 mm on PDA and 50.30 mm on MEA. On the other hand, CI-24-206 showed the least growth on PDA (54.76 mm) and MEA (51.16 mm). Its growth rate was classified as slightly slower in comparison to the other strain tested (Table no. 1, Figure 1 and Plate 2).

Table 1: Cultural characterization of different strains of Calocybe indica on two different growth media in laboratory condition

S. No.	Treatments (Strain)	Mycelial growth on Potato dextrose agar (mm)	Mycelial growth on Malt extract agar (mm)
1	T_1 (CI-24-201)	73.30	68.60
2	T_2 (CI-24-202)	80.53	75.80
3	T_3 (CI-24-203)	64.56	62.30
4	T_4 (CI-24-204)	68.76	66.03
5	T_5 (CI-24-205)	57.86	50.30
6	T_6 (CI-24-206)	54.76	51.16
	SEm±	0.56	0.71
	CD(p=0.05)	1.76	2.23

All the observations are average of three replications.

Table 2: Growth performance of various strains of Calocybe indica in cropping room

S. No.	Treatments (Strain)	Days taken in spawn run	Days taken in pin head initiation	Days taken 1st harvest after casing	No. of fruiting bodies / bags	Total Yield (g/kg substrate)	Biological Efficiency (%)	Avg. per fruit body weight (g)
1	**T_1 (CI-24-201)**	25.00	23.25	32.25	7	604.94	60.49	86.42
2	**T_2 (CI-24-202)**	22.50	20.50	30.75	8	685.68	68.56	85.71
3	**T_3 (CI-24-203)**	20.50	21.75	28.75	9	694.98	69.49	77.22
4	**T_4 (CI-24-204)**	23.75	22.25	31.00	8	624.00	62.40	78.00
5	**T_5 (CI-24-205)**	17.50	19.50	28.25	9	790.20	79.02	87.80
6	**T_6 (CI-24-206)**	19.50	20.00	29.50	9	715.68	71.56	79.52
	SEm±	0.13	0.14	0.16	0.13	1.80	0.18	0.27
	CD(p=0.05)	0.41	0.43	0.49	0.40	5.40	0.54	0.80

All the observations are average of four replications.

Table 3: Morphological characterization of different strains of Calocybe indica

S. No.	Treatments (Strain)	Pileus	Pileus surface	Pileus Shape	Pileus Colour	Pileus Margin	Stipe Attachment	Pigmentation in Gills
1	T_1 (CI-24-201)	Present	Dull dry	Convex	White	Inrolled	Central	White
2	T_2 (CI-24-202)	Present	Dry flat	Broadly convex	White	Uplifted	Central	Off white
3	T_3 (CI-24-203)	Present	Dull dry flat	Convex	White	Uplifted	Central	White
4	T_4 (CI-24-204)	Present	Dull dry	Convex	Creamy-white	Inrolled	Lateral	Creamy-white
5	T_5 (CI-24-205)	Present	Dry	Convex	Off white	Uplifted	Lateral	Off White
6	T_6 (CI-24-206)	Present	Dry flat	Broadly convex	White	Uplifted	Central	Off White

All the observations are average of four replications.

Table 4: Morphological measurement of Pileus, Stipe of different strains of Calocybe indica

S. No.	Treatments (Strain)	Average Diameter of Pileus (cm)	Average Length of Stipe (cm)	Average Diameter of Stipe (cm)
1	T_1 (CI-24-201)	7.90	8.90	2.5
2	T_2 (CI-24-202)	8.80	10.60	2.7
3	T_3 (CI-24-203)	10.13	10.33	2.6
4	T_4 (CI-24-204)	11.03	8.33	2.4
5	T_5 (CI-24-205)	13.30	10.22	2.5
6	T_6 (CI-24-206)	9.40	10.01	2.2
	SEm±	0.78	0.28	0.16
	CD(p=0.05)	0.26	0.84	N/S

All the observations are average of four replications.

Various researchers have extensively studied the cultural characteristics of *Pleurotus* spp. across different media. This was corroborated by Kerkatta *et al*., (2018), who consistently observed superior mycelial growth on PDA.emphasized the efficacy of MEA for specific *Calocybe indica*. Singh *et al*. (2020) also confirmed PDA's superiority over synthetic and alternative media.

Morphological characterization of different strains of *Calocybe indica*

The growth and yield performance of six strain of *Calocybe indica* were evaluated under controlled conditions. Considerable variation was observed among the strains in terms of days taken for spawn run, pinhead initiation, 1st harvest after casing, total yield, biological efficiency, number of fruiting bodies per bag and average fruit body weight (Table no. 2, Figure 2,3,4).

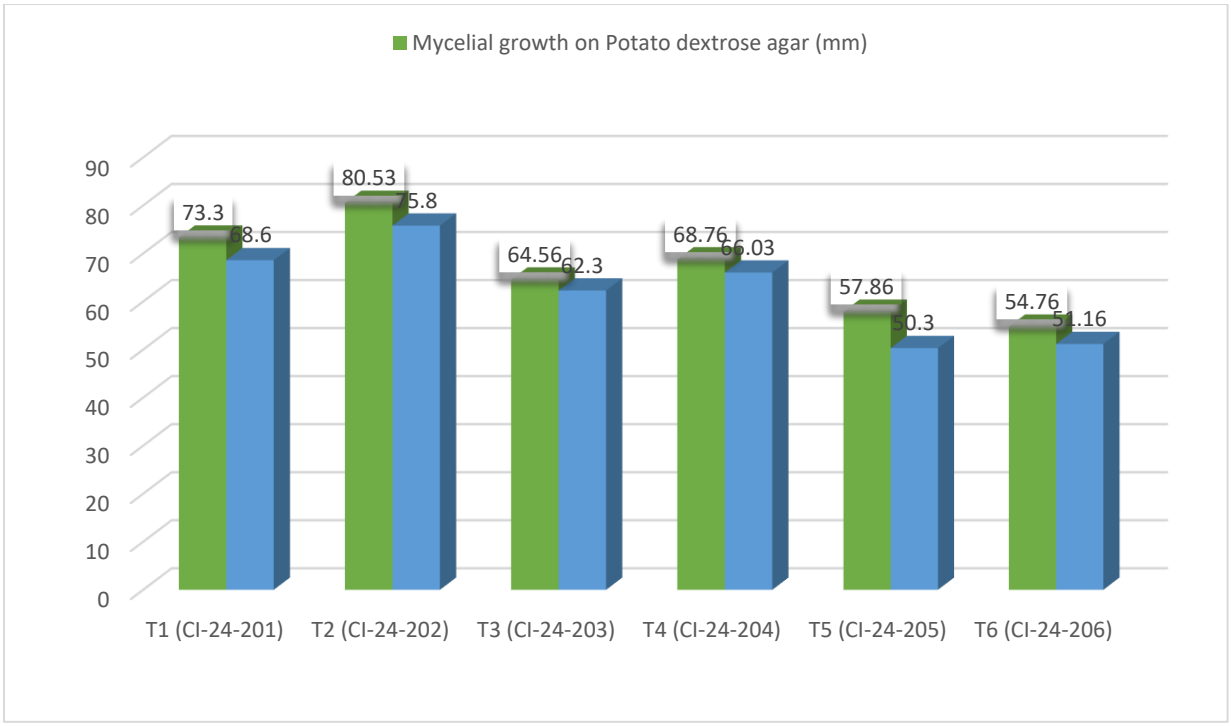


Fig 1: Effect of different growth media on the mycelial growth of different strains of Calocybe indica

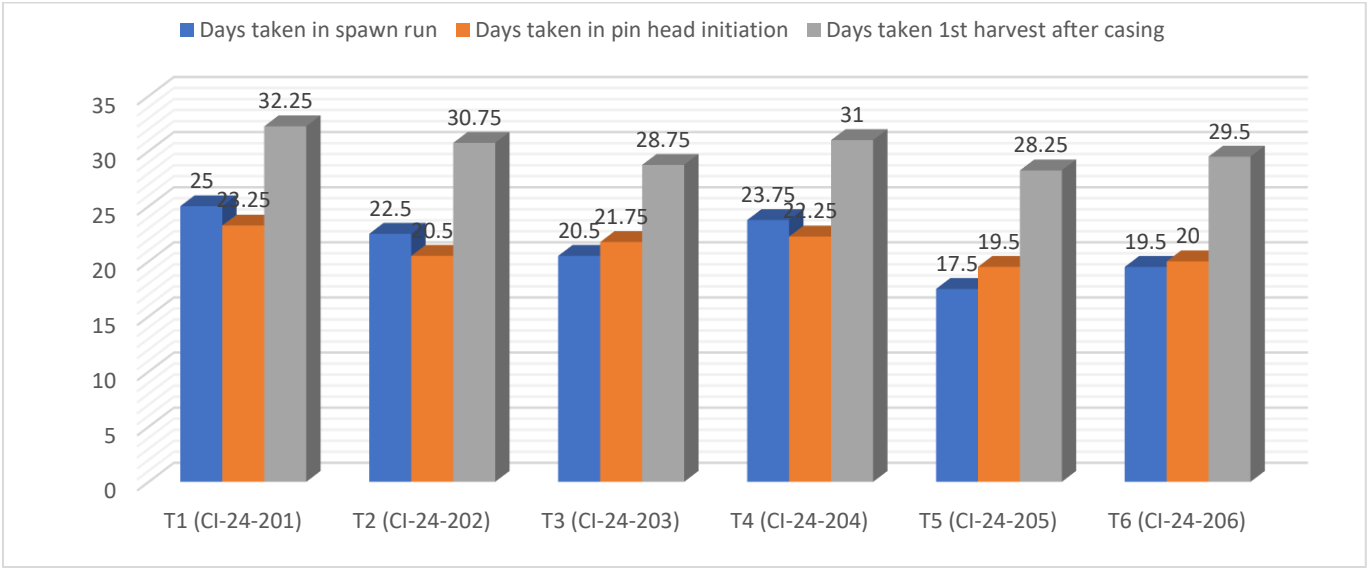


Fig 2: Average number of days taken in spawn run completion to average number of days taken 1st harvest after casing on different strains of Calocybe indica.

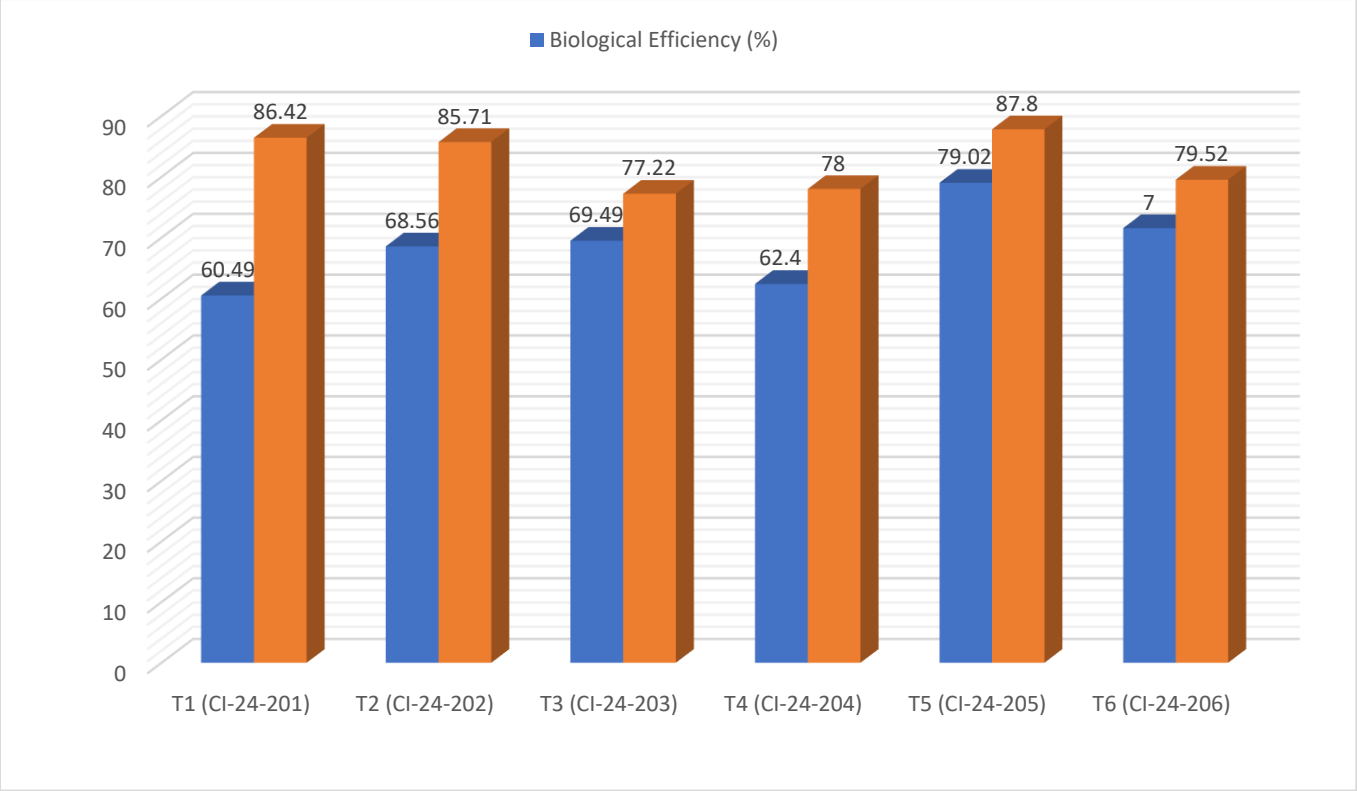


Fig 3: Biological Efficiency (%) and average fruit body weight of different strains of Calocybe indica

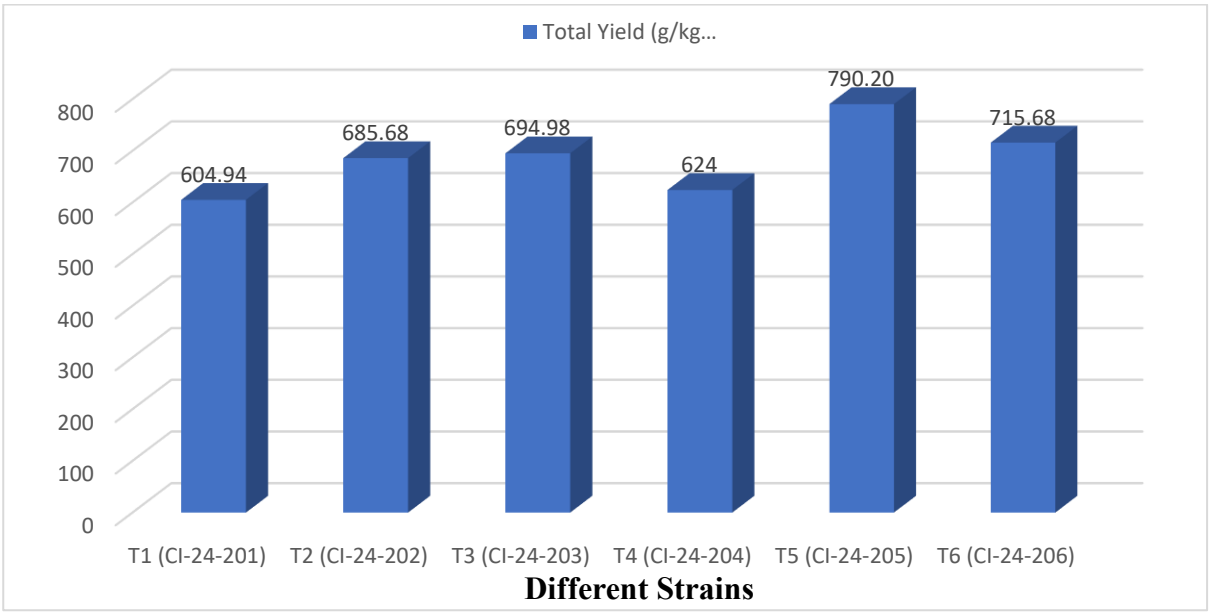


Fig 4: Total yield (g/kg substrate) of different strains of Calocybe indica

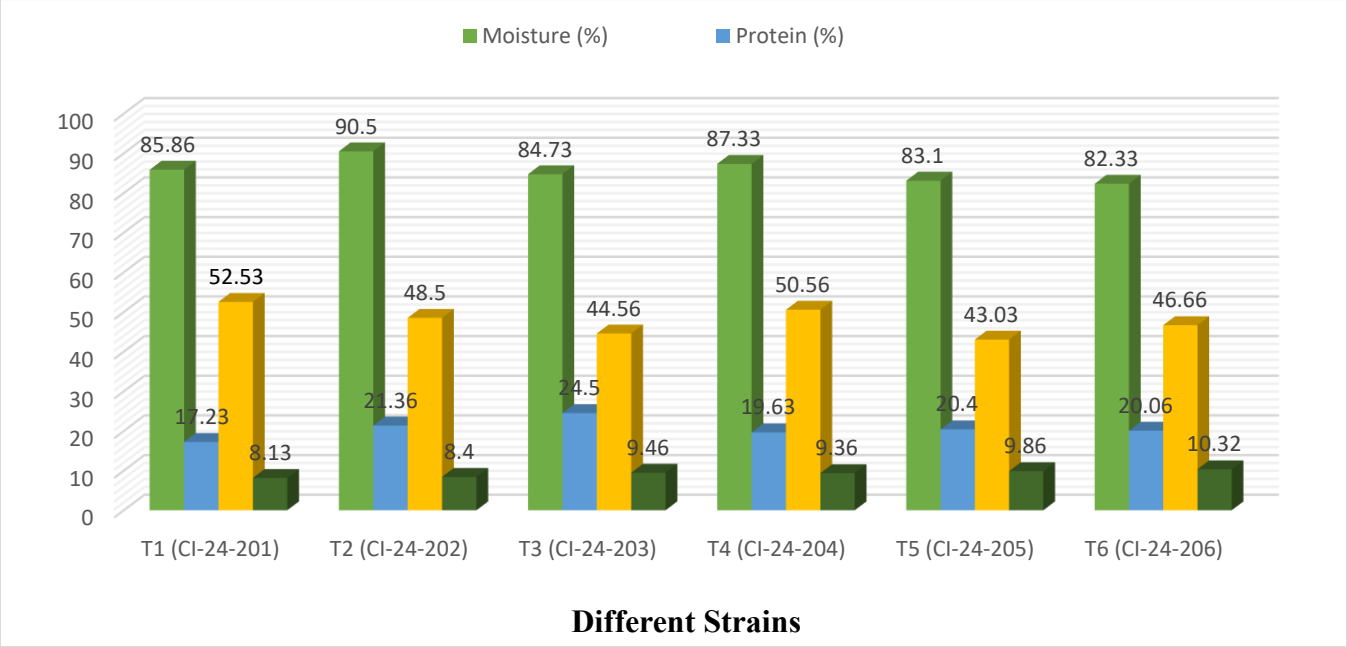
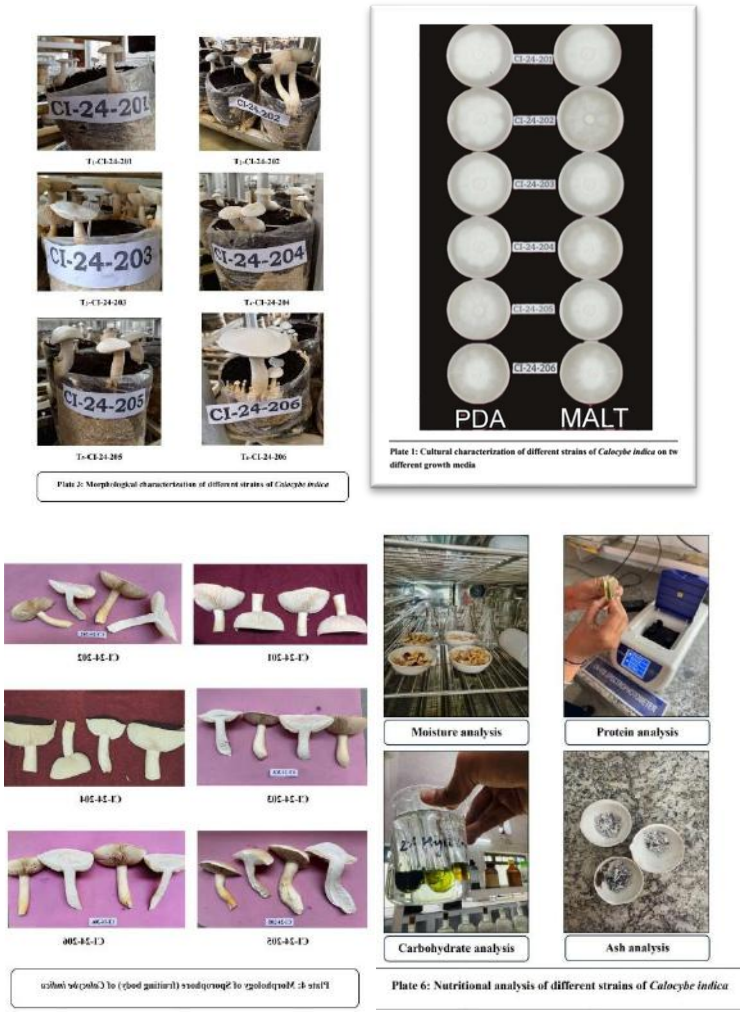


Fig 5: Moisture, protein, carbohydrates and ash contents in different strains of Calocybe indica



Spawn run and pinhead initiation

The shortest spawn run was recorded in CI-24-205, which completed colonization in 17.50 days, followed by CI-24-206 (19.50 days), CI-24-203 (20.50 days), CI-24-202 (22.50 days), CI-24-204 (23.75 days) and CI-24-201 took the longest time of 25 days. After casing application CI-24-205 also exhibited the earliest pinhead initiation (19.50 days), followed by CI-24-206 (20 days), CI-24-202 (20.50 days), CI-24-203 (21.75 days), CI-24-204 (22.25 days) and CI-24-201 took the longest time of 23.25 days.

Days taken 1st harvest after casing

The shortest days taken 1st harvest after casing was recorded in CI-24-205, which completed in 28.25 days, followed by CI-24-203 (28.75 days), CI-24-206 (29.50 days), CI-24-202 (30.75 days), CI-24-204 (31 days) and CI-24-201 took the longest time of 32.25 days

Total yield (biological efficiency)

The highest total yield (790.20 g/bag) was obtained from CI-24-205, corresponding to a biological efficiency (B.E.) of 79.02%, indicating its superior performance. CI-24-206 ranked second in yield (715.68 g/bag) with 71.56% B.E., followed by CI-24-203 (694.98 g/bag, 69.49% B.E.), CI-24-202 (685.68 g/bag, 68.56%) and CI-24-204 (624 g/bag, 62.40% B.E.). While, the lowest yield was observed in CI-24-201 (604.94 g/bag), with the minimum biological efficiency of 60.49%.

Fruiting body characteristics

Among the six strains, the highest number of fruiting bodies per bag (9) was produced in CI-24-203, CI-24-205 and CI-24-206, followed by (8) CI-24-202 and CI-24-204. However, the minimum number of fruiting bodies per bag (7) was produced in CI-24-201. The maximum average fruit body weight (87.80 g) was of CI-24-205, followed by CI-24-201 (86.42 g), CI-24-202 (85.71 g), CI-24-206 (79.52 g) and CI-24-204 (78 g). While the minimum average fruit body weight (77.22 g) was found in CI-24-203.

The morphological features of the pileus (fruiting body cap) of six different strains of *Calocybe indica* were examined and characterized based on surface, shape, margin, colour, pigmentation in gills and attachment. All strain exhibited the presence of a pileus, but with distinct interspecific variation in structural features.

Pileus surface and shape

CI-24-201 displayed a dull dry surface with a convex shape. The margin was inrolled. The pileus was centrally attached to the stipe. It was characterized by a white pileus and white gills, maintaining uniform pigmentation throughout maturity. CI-24-202 showed a dry, flat pileus surface, with a shape ranging broadly convex. The margin uplifted, and the attachment was central. The fruiting body showed white pigmentation with gills that off white as they aged. CI-24-203 was characterized by a dull dry flat pileus with a convex shape. Its margin was uplifted and the cap was centrally attached. It was characterized by a white pileus and white gills. CI-24-204 featured a dull dry pileus with a convex shape. The margins were inrolled, and attachment was lateral, indicating slight off-cantering of the stipe. The vibrant creamy white colour pileus and gills of this strain. CI-24-205 exhibited a dry pileus surface with a convex shape. The margins were uplifted and the attachment remained lateral. Despite a similar shape to other species, its off-white coloration of pileus and gills make it distinguishable. CI-24-206 showed a dry, flat pileus surface, with a shape ranging broadly convex. The margin uplifted, and the attachment was central. The fruiting body showed white pigmentation with gills that off white as they aged (Table no. 3 and Plate 3)

Fruit body dimensions

The average pileus diameter ranged from 7.90 – 13.30 cm across all strains. The largest pileus diameter was recorded in CI-24-205 (13.30 cm), followed by CI-24-204 (11.03 cm), CI-24-203 (10.13 cm), CI-24-206 (9.40 cm) and CI-24-202 (8.80 cm), while lowest pileus diameter was recorded in CI-24-201 (7.90 cm). The average stipe length ranged from 8.33 to 10.60 cm, with CI-24-202 producing the longest stipe (10.60 cm), followed by CI-24-203 (10.33 cm), CI-24-205 (10.22 cm), CI-24-206 (10.01 cm) and CI-24-201 (8.90 cm), while lowest stipe length was recorded in CI-24-204 (8.33 cm). The stipe diameter remained relatively uniform, varying between 2.2 to 2.7 cm. The largest stipe diameter was recorded in CI-24-202 2.7 cm, while lowest stipe diameter was recorded in CI-24-206 2.2 cm (Table no. 4)

Nutritional analysis of different strains of *Calocybe indica*

The nutritional composition of six strain of *Calocybe indica* was analysed and found to vary significantly across key parameters such as moisture, protein, carbohydrates, ash content. These values are crucial in determining the dietary and commercial value of the *Calocybe indica* (Table no. 5, Fig 5 and Plate 4).

Table 5: Nutritional analysis of different strain of Calocybe indica.

S. No.	Treatments (Strain)	Moisture (%)	Protein (%)	Carbohydrates (%)	Ash (%)
1	T_1 (CI-24-201)	85.86	17.23	52.53	8.13
2	T_2 (CI-24-202)	90.50	21.36	48.50	8.40
3	T_3 (CI-24-203)	84.73	24.50	44.56	9.46
4	T_4 (CI-24-204)	87.33	19.63	50.56	9.36
5	T_5 (CI-24-205)	83.10	20.40	43.03	9.86
6	T_6 (CI-24-206)	82.33	20.06	46.66	10.32
	SEm±	0.41	0.36	0.94	0.23
	CD(p=0.05)	1.30	1.12	2.94	0.73

All the observations are average of three replications.

Moisture content: The highest moisture content was observed in CI-24-202 (90.50%), followed by CI-24-204 (87.33%), CI-24-201 (85.86%), CI-24-203 (84.73%), and CI-24-205 (83.10%). CI-24-206 had the lowest moisture content (82.33%), which may contribute to a longer shelf life and higher concentration of dry matter nutrients.

Protein content: Samples of each strain were analysed in the laboratory and results revealed that the protein content in ranged 17.23% - 24.50%. However, maximum protein content (24.50%) was found in CI-24-203, followed by CI-24-202 (21.36%), CI-24-205 (20.40%), CI-24-206 (20.06%) and CI-24-204 (19.63%). While, the minimum protein content 17.23% was obtained in CI-24-201.

Carbohydrate content: The laboratory analysis of each strain's samples showed that their carbohydrate content varied between 43.03% to 52.53%. However, maximum carbohydrate content (52.53%) was found in CI-24-201, followed by CI-24-204 (50.56%), CI-24-202 (48.50%), CI-24-206 (46.66%) and CI-24-203 (44.56%). While CI-24-205 had the lowest carbohydrate amount, (43.03%)

Ash content: Laboratory analysis of each strain's samples showed that the Ash content in ranged from 8.13 - 10.32%. However, CI-24-206 had the highest Ash content (10.32%), followed by CI-24-205 (9.86%), CI-24-203 (9.46%), CI-24-204 (9.36%) and CI-24-202 (8.40%). While CI-24-201 had the lowest Ash content, which was (8.13%).

Present investigation revealed that the nutritional composition of different six strains of *Calocybe indica viz*., CI-24-201, CI-24-202, CI-24-203, CI-24-204, CI-24-205 and CI-24-206 showed that the highest moisture content 90.50 per cent recorded in strain CI-24-202 and lowest moisture content 82.33 per cent was in CI- 24-206. However, maximum ash content 10.32 per cent was recorded in strain CI-24-206 and lowest ash content 8.13 per cent was in CI-24.201. While, highest protein content 24.50 per cent was recorded in strain CI-24-203 and lowest protein content 17.23 per cent recorded in CI-24.201 and highest carbohydrate content 52.53 per cent was in strain CI-24.201 and lowest carbohydrate content 43.03 per cent recorded in CI-24-205.Similar findings were made by Venktesh *et al*., 2019 who studied the nutritional quality of different strains of milky mushroom namely *viz.,* CI-1, CI-2, CI-3, CI-5 and APK-2. Among the five strains, strain CI-5 showed the maximum ash content (9.82 %), strain CI-2 showed maximum moisture content (88.9%), strain CI-1 showed maximum carbohydrate (55.32 %) and strain CI-3 showed maximum protein content (24.50 %). However, Chelladurai *et al*., 2014 also studied that the hundred grams of dry *C. indica* contains of moisture, proteins, carbohydrate, fiber, fat, ash, ether extract, pH, total nitrogen and total carbon were found to be 89, 14.09, 13.09, 5.63, 8.02, 4.6, 7.05, 3.57, 33.60 and 5.4 mg/100 g, respectively.

IV. CONCLUSION

This study revealed significant differences among six strains of *Calocybe indica* (CI-24-201 to CI-24-206) in cultural, morphological and nutritional characteristics. CI-24-205 was the most promising, showing the highest yield (790.20 g/bag), biological efficiency (79.02%), early spawn run (17.5 days), shortest time to harvest (28.25 days), largest pileus (13.30 cm) and heaviest fruit bodies (87.80 g). CI-24-203 had the highest protein content (24.50%) but the lowest fruit body weight (77.22 g). CI-24-201 recorded the highest carbohydrate content (52.53%) but lowest yield (604.94 g), lowest biological efficiency (60.49%) and lowest protein (17.23%). CI-24-202 had the fastest mycelial growth (80.53 mm), longest stipe (10.60 cm) and highest moisture content (90.50%).

CI-24-206 exhibited the highest ash content (10.32%) and lowest moisture (82.33%), indicating better shelf life. CI-24-204 performed moderately in all parameters. These findings suggest strain-specific applications for commercial cultivation, targeting high yield, nutritional value, or post-harvest durability.

ACKNOWLEDGMENT

The authors sincerely acknowledge the Head and Professor of the Department of Plant Pathology, along with the Dean of Rajasthan College of Agriculture, Udaipur, for their valuable support, provision of research facilities and scientific guidance, which were instrumental in the successful completion of this study.

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