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# Suitability of various substrates for the spawn and bed preparation of *Calocybe indica*

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**Abstract**
Among the various substrates tested for spawn production, C. *indica* rapidly colonized and produced maximum weight of sporphore with 337.1 gm and 332.12 gm in sorghum grain and ill - filled paddy grain spawn respectively. Among the various substrates tested, paddy straw followed by sorghum stalk was found to be the best substrates for the sporophore production of *C. indica.* The yield was significantly less in all other substrates.

**Keywords:** *Calocybe indica*, sorghum grain, Ill-filled paddy grain

## 1. Introduction
Acute protein malnutrition, a glaring reality in the developing countries, has forced the planners and nutritionists to think about alternate sources of proteins. The traditional source of protein (production of pulses) in the Indian diet, has not kept pace with the population growth. Mushrooms, one of the highest protein producers per unit area from the worthless Agro wastes, fit in well in scheme of the things to fight the malnutrition.
About 2000 species from 300 genera are regarded as prime edible mushrooms. Among them, 80 are experimentally grown, 40 are economically cultivated and only 5-6 have been produced on an industrial scale in many countries (Chang and Miles, 1991). In India, about 200 species belonging to 70 genera are reported to be edible (Chandha, 1992).
Among the cultivated mushrooms in India *Calocybe indica* seems to be the best alternative to *Agaricus* for to be cultivated in tropical and subtropical conditions. Hence, the current studies have been mainly focused on to find the suitability of various bed substrates and spawn substrates for the successful cultivation of *Calocybe indica.*

## Materials and Methods
### Effect of various spawn substrates
To select a suitable substrate for spawn production, five grains viz., Pearl millet, maize, ill-filled paddy, paddy and sorghum, two pulses viz., black gram and green gram and other substrates viz., rice husk and sugarcane bagasse were used. The ill-filled paddy grains (IFPg) were separated by using winnowing technique. For spawn preparation the standard procedure reported by Munjal, (1973) was followed. After sterilization, the spawn substrates (bottles) were inoculated with pure culture of the mushroom fungus. The bottles were incubated at room temperature (25 ± 2°C) until complete colonization took place. The spawn thus prepared was further evaluated for its productivity using steam pasteurized paddy straw as bed substrate.

### Suitability of various substrates for the cylindrical bed preparation
The locally available substrates were explored as bed substrates to select the prime supporter for the production of *Calocybe indica.* The substrates used for the experiment were banana pseudostem, paddy straw, sunflower stalk, saw dust, sorghum stalk and water hyacinth. The substrates were cut in to bits (4- 6 cm) where ever required and soaked in water for a period of 6 h. (Sivaprakasam, 1980). The sterilized substrates were spawned with *C. indica* and incubated in the cropping room for sporophore production. After complete spawn run the beds were cut in to two equal halves and cased with red soil for facilitating fructifications.

## Results and Discussion
It has been found that C. *indica* could grow and colonize with considerable variations with different spawn substrates. Colonization of the substrate was completed with in 13 days in sorghum grains and ill-filled paddy gains which was closely followed by paddy grains

(12 days). Maximum spawn run of 17-18 days was recorded in both the pulse grains tested. When sorghum grain spawn is used for sporophore production the minimum sporophore maturity time of 11 days was recorded and ill-filled paddy grains recorded 12 days, which was followed by paddy grains (13 days) and rice husk (13 days) in the decreasing order of merit. The weight of sporophore is also maximum in sorghum grain spawn (337-1 gm) followed by ill-filled paddy grain spawn (332-12 gm).

**Table 1:** Effect of various spawn substrates on the sporophore production by *Calocybe indica*

| Spawn substrates | Spawn run | Sporophore | *Weight of |
|---|---|---|---|
| | (days) | maturity (per bed) | Sporophores / bed |
| | | | (g/bed) |
| Sorghum grains | 11 | 11 | 337.10 |
| Pearl millet grains | 13 | 14 | 318.71 |
| Maize grains | 15 | 14 | 303.42 |
| Black gram grains | 17 | 16 | 271.50 |
| Green gram grains | 18 | 17 | 264.70 |
| Paddy grains | 12 | 13 | 325.77 |
| 111 -filled paddy | 11 | 12 | 332.12 |
| grains | 13 | 13 | 310.64 |
| Rice husk | 16 | 15 | 281.49 |
| Sugarcane bagasse | | | |
| | 1.16 | 1.02 | LQ8 |
| CD(P=0.5) | 0.41 | 0.39 | 0.38 |
| SE | | | |

* Mean value of three replications

Black gram and green gram were found to be inferior for spawn preparation. Thus, the result clearly showed that sorghum grain is the ideal spawn substrate for the sporophore production of *C. indica*

The variation in colonization of different spawn substrates could be due to variation in the amount of moisture absorbed during boiling which is one of the critical factors responsible for mycelial growth (Mehta, 1985). Rangad and Jandaik (1977a) found maximum yield with sorghum grain spawn in different *Pleurotus spp.* Sivaprakasam and Kandaswamy (1981) obtained good yield of P.sajor-caju with sorghum and pearl millet as grain spawn. Sharrna (1984) recorded equally good colonization *of P.eryngii on.* wheat, sorghum and pearl millet. Dishi *et al* (1989) reported that early fruit body production was noticed on sorghum grain spawn. These reports lend support to the present findings.

**Table 2:** Suitability of various substrates for the bed preparation for *Calocybe indica*

| Substrate | *Weight of sporophores/bed (g/bed) |
|---|---|
| Paddy straw | 348.91 |
| Sunflower stalk | 204.44 |
| Banana pseudostem | 304.67 |
| Sorghum stalk | 331.41 |
| Saw dust (Smooth) | NG |
| Water hyacinth | 237.61 |
| CD(P=0.05) =2.75 | |
| SE = 0.97 | |

* Mean value of three replications
NG = No growth

Paddy straw was found to be the best substrate for C. *indica* as the same recorded the maximum sporophore yield of 348.91 g/ bed followed by sorghum stalk i.e. 331.41 g/ bed. The yield was significantly less in all other bed substrates.

It is clear that the nature of substrate more positively influenced on sporophore yield. The saw dust substrate deprived the sporophore formation in *C. indica.* Sunflower stalk (204.44 g) and water hyacinth (237.61 g) recorded poor yield. The results clearly indicated that paddy straw substrate is the best bed substrate among the various bed substrates tested. Cellulose and lignin in the substrates were important components deciding the yield of sporophores (Zadrazil, 1974). The yield of sporophores was related positively with cellulose content and negatively with the lignin and ortho-dihydroxy phenolic conent of the substrate (sivaprakasam, 1980). High cellulase enzyme production was positively correlated with the yield of sporophores (Ramasamy and Kanda Swamy, 1976). The mycelial running and sporophore yield of C. *indica* are for better in decomposed substrate in which the lignin content is less at the same time amount of soluble sugar is high that are more preferably utilized by mycelium of *C. indica* (Chakravarthy *et al*, 1981, Purkayastha and Chandra, 1985).

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