Systematic position and salient features of Agaricus

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Scientific classification

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Agaricaceae

Genus: *Agaricus*

Species: *campestris*

Binomial name

Agaricus campestris

Introduction :

Agaricus is a saprophytic fungus, commonly grows on damp wood, decomposing organic matters like humus, horse dung etc. During summer with rainy weather, it is fairly common in the grassy lands. Butler and Bisbay (1958) recorded 25 species of Agaricus from India.

Vegetative Body of Agaricus:

- Vegetative body is mycelial and consists of septate much branched hyphae.
- Spores on germination develop into monokaryotic or primary mycelium, either + or – type (Fig. I A, B).

- The primary mycelium is short-lived and it soon transforms into dikaryotic or secondary mycelium (Fig. I) by the fusion of two cells of different monokaryotic mycelium (+ and -) following clamp connection (Fig. II).

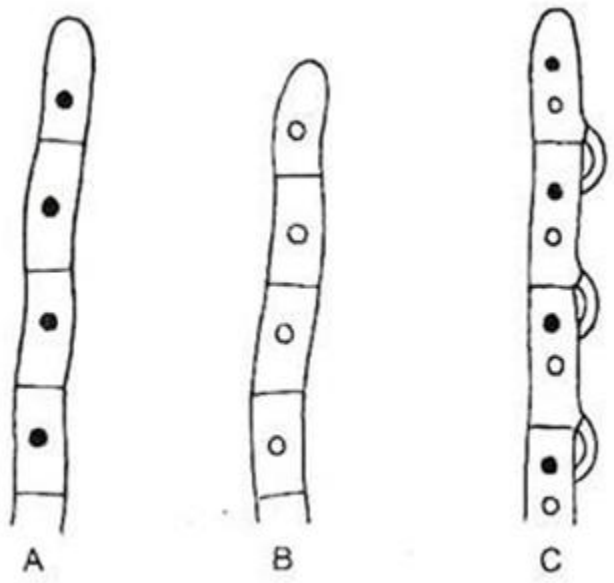

Fig.I :Agaricus,A-B. Monokaryotic mycelia,C. Dikaryotic mycelium

- The hyphae of the dikaryotic mycelia interlace and twist together to form thick white hyphal cord, called rhizomorph which bear the fruit bodies.

Reproduction :-

Agaricus reproduces by all the three means:-

Vegetative, Asexual and Sexual.

1. Vegetative Reproduction:

It is mostly propagated by vegetative means where dikaryotic mycelium develops spawn---" the mushroom seed".

2. Asexual Reproduction:

- By chlamydospores during unfavourable condition.
- Terminal or intercalary chlamydospores are developed on dikaryotic mycelium,
- On germination during favourable condition produce dikaryotic mycelium.

3. Sexual Reproduction:

- Sex organs are absent and sexual reproduction takes place by somatogamy.

- Most of the species including *A. campestris* are heterothallic, but *A. brunescens* is homothallic.
- Somatogamy includes **plasmogamy, karyogamy and meiosis.**
- Karyogamy does not take place immediately after plasmogamy, but meiosis follows soon after karyogamy**:**

a) Plasmogamy

- Two cells of monokaryotic hyphae of opposite strains (+ and -) come in contact with each other (Fig. II).

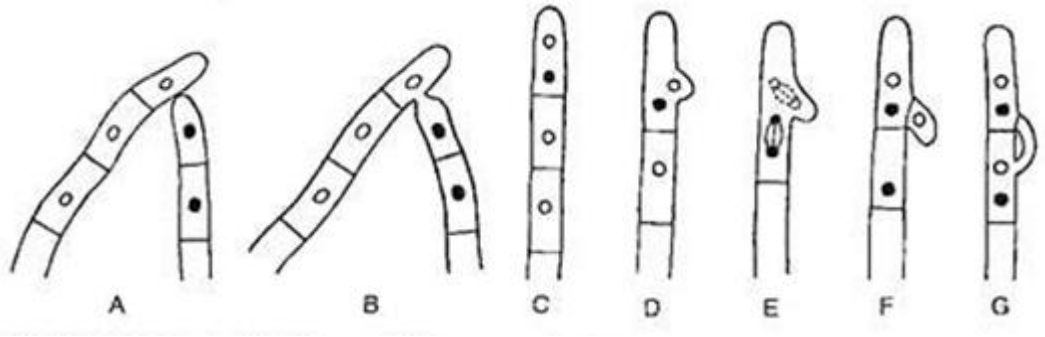

Fig : II. A-B,Stages of plasmogamy,C-G Growth of mycelium by Clamp Connection.

- The cell wall dissolves at the point of contact and a dikaryon (n + n) is formed (Fig. II B, C).
- This dikaryotic cell develops into dikaryotic mycelium by regular cell divisions through clamp connection (Fig. II. D-G).
- The dikaryotic mycelia are subterranean and after aggregation at some points they form button which remains dormant before the rain comes during late summer.
- After rain, the soil becomes soft and the button develops into fruit body.

b) Karyogamy:

- It takes place in the young basidium which develops on gills of the fruit body.
- Both the nuclei fuse together and form diploid nucleus

c) Meiosis:

- It takes place soon after Karyogamy and forms four haploid nuclei.
- The basidiospores, thus formed on the sterigma of basidium are haploid and either of + or – type.

Development of Basidiocarp in Agaricus:

- The underground dikaryotic mycelia aggregate at some points and form a knob-like structure, called button.

- The button does not grow in dry season and remains hidden one or two inch (2.5-5 cm) below the soil surface.
- In the late summer with heavy rain, when the soil becomes moist and soft, the button grows rapidly and develops the basidiocarp (Fig. III).
- During development, the button is differentiated into a basal bulbous part and an apical hemispherical region.
- The bulbous part gradually differentiates into elongated, solid, cylindrical structure, the stipe and the hemispherical region differentiates into a round, convex region, looks like the top of an open umbrella, the pileus (Fig. III.E).

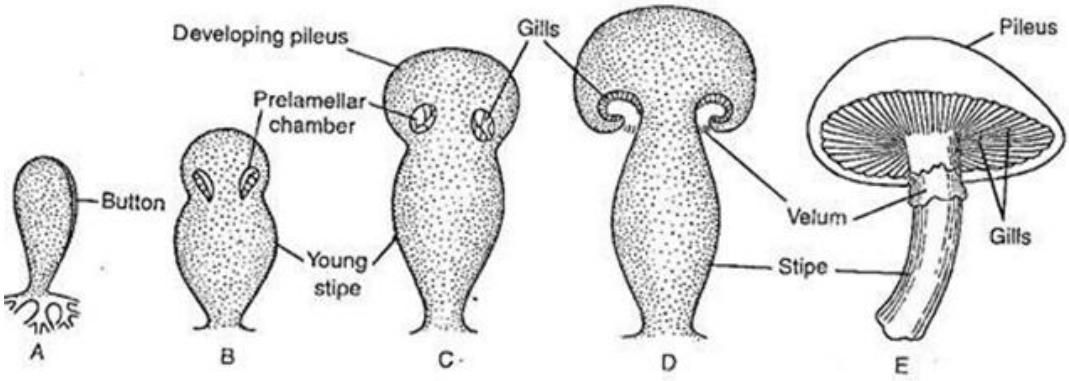

FIG :III. Agaricus :A-E Development of basidiocarp.

- Towards the bottom of the hemispherical region some hyphae are drawn apart and form a ring-like cavity, the prelamellar chamber (Fig. III B, C). The upper surface of prelamellar chamber becomes deeply concave and lined with alternating radial bands of slow and rapidly dividing cells.
- The region with rapid division forms gill-primordia, which develops into gills, that hang downwardly into the prelamellar chamber (Fig. III.D).
- The top of the hemispherical region (pileus surface) expands resulting in the increase in radial interspaces between the gills. The edge of the pileus of young basidiocarp connects with the stipe by a membranous tissue called the velum, partial veil or inner veil (Fig. III.E).
- Further expansion of the pileus causes discontinuation with velum and the pileus fully expands out like the top of an open umbrella, with numerous gills attached on its lower side (Fig. III.E). The velum remains attached with the upper part of the stipe in the form of a ring, the annular ring or annulus.