

Fungi

Learning Objectives

- Define the terms: saprophytic & parasitic
- State the structure & life cycle of Rhizopus
- Explain nutrition in fungi.
- Outline the structure & reproduction of Yeast
- Name 2 Beneficial & 2 Harmful fungi
- Mention that there are Edible and Poisonous fungi
- Identify and state functions for the following structures: rhizoid, sporangium, gametangium, zygospore.



Features of Fungi

- They do not make their own food
- They are mostly multi-cellular
- They are made up of threads called hyphae
- Hyphae combine in masses to form a mycelium
- Their walls are made of a carbohydrate called **chitin**



Nutrition

- All fungi are **heterotrophs** i.e. they take in food made by other organisms

Fungi are either:

- **Parasitic**
- **Saprophytic**

Saprophytic fungi

- Most fungi are saprophytic
- obtain nutrients from dead material
- As they digest it minerals are released and recycled
- Play a vital role in the environment as they are responsible for decay
- E.g. mushrooms and moulds



Parasitic Fungi

- Absorb their food from live hosts
- They get their food mostly from plants although some fungal parasites live on animals e.g. athlete's foot



Parasitic Fungi

- **Obligate parasites**
 - live on live hosts but do not normally kill them
- **Facultative parasites**
 - kill the host and feed on the remains



Symbiosis

- Some fungi e.g. form **symbiotic** relationships with other organisms
- A lichen is an organism which is a combination of a fungus and an alga



Edible and poisonous fungi

- Some fungi are edible, but many are poisonous if eaten
- It is often difficult to distinguish between the edible and poisonous varieties growing in the wild



Rhizopus- Bread Mould





Rhizopus growing on agar

Consists of threadlike structures called Hyphae

Hypha →

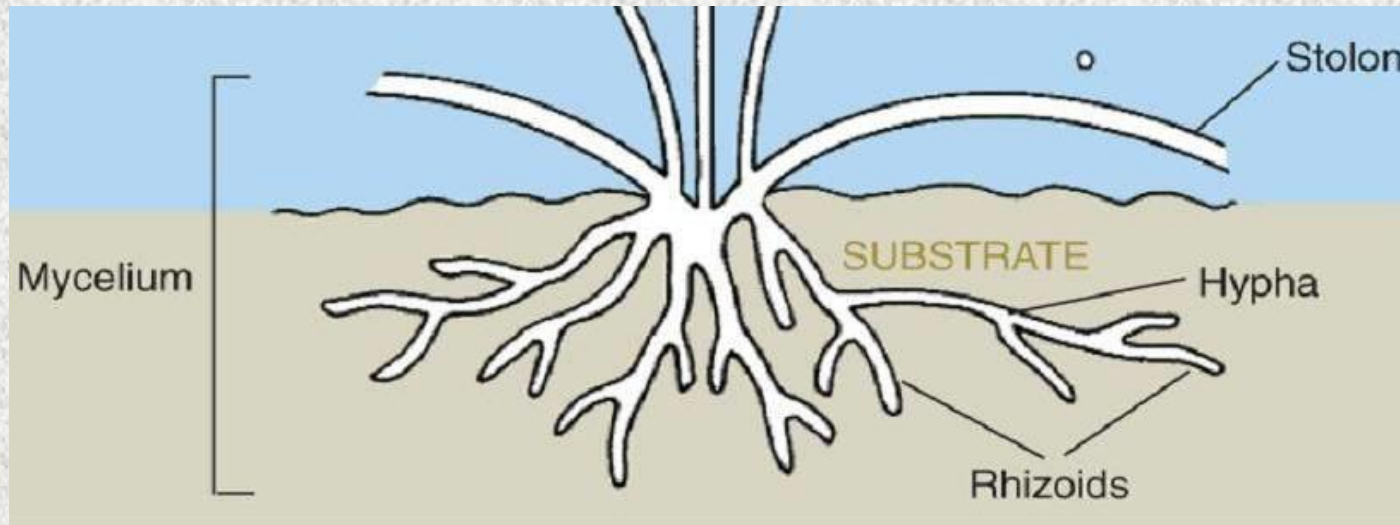


They are tubular with no cross walls and are **multinucleate**. Each nucleus is haploid.

Nucleus



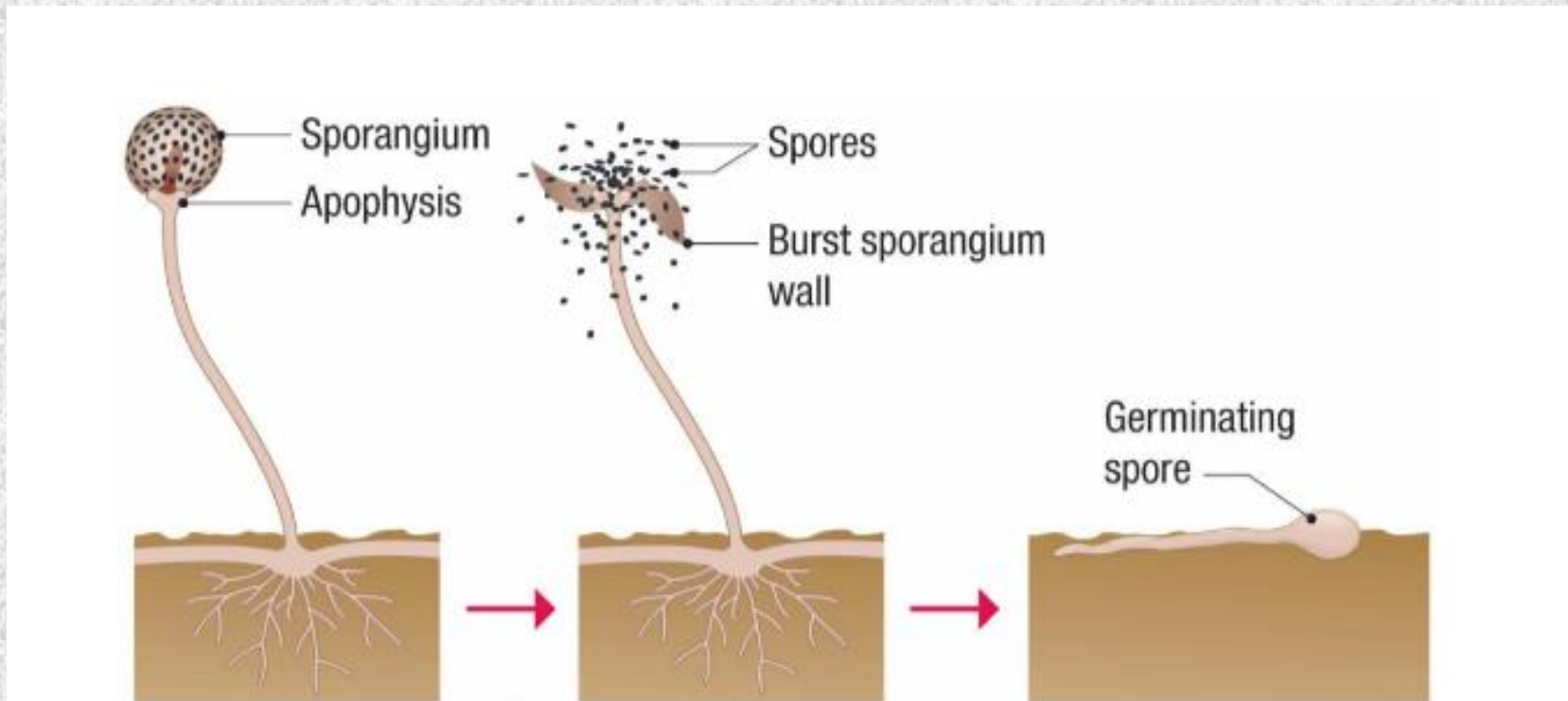
Large numbers of hyphae are called a **mycelium**



Nutrition (Rhizopus – Saprophytic)

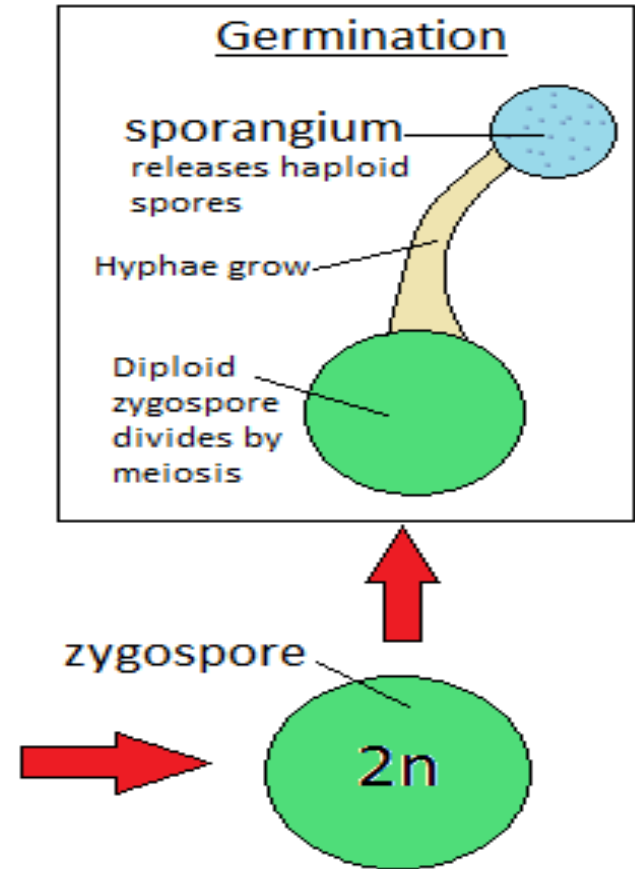
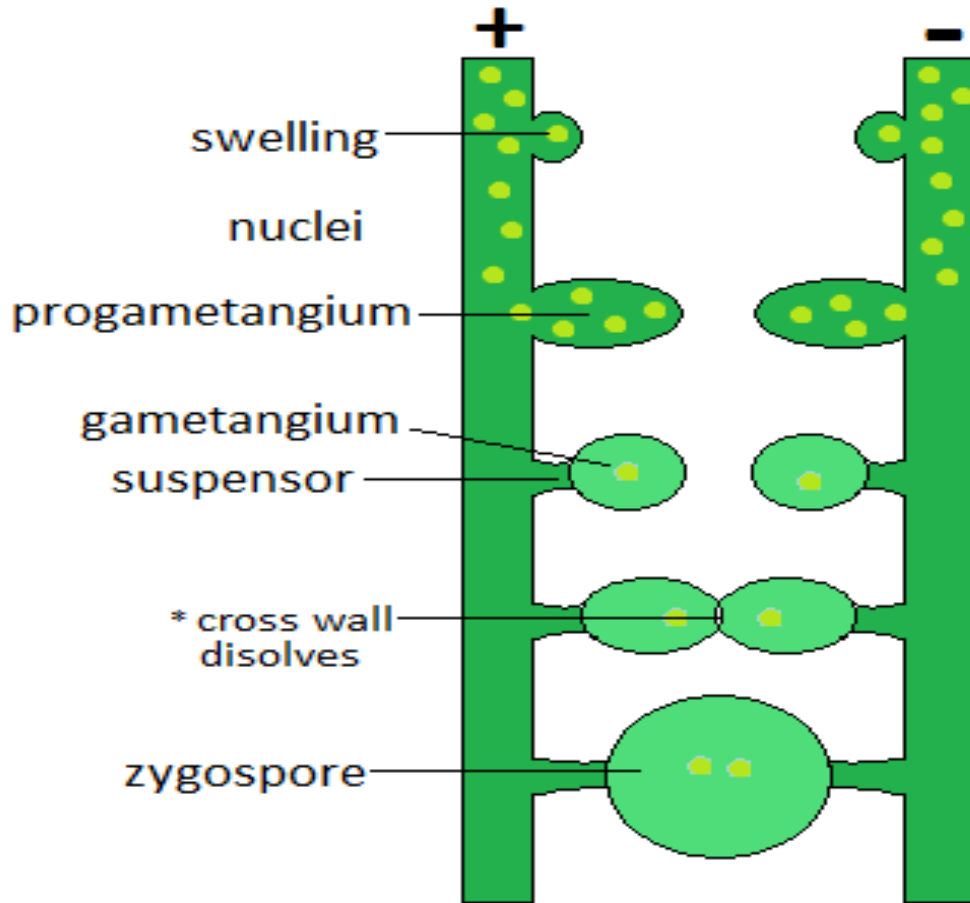
- The hyphae digest the substrate on which they grow
- Rhizoids** provide extra surface area for absorption of the digested material
- Stolons are aerial hyphae which allow Rhizopus to spread sideways

Asexual Reproduction in Rhizopus (Main method of REproduction)



- Some hyphae grow up vertically from the substrate and form a **sporangium**.
- **Mitosis** occurs.
- Each cell develops a resistant wall and is now called a **spore**.
- In dry conditions the sporangium dries out and bursts, releasing spores.
- If spores land on a suitable substrate, they will **germinate**.
- A new mycelium will form.

Sexual Reproduction of Rhizopus (Only under harsh conditions like lack of water-method of survival)



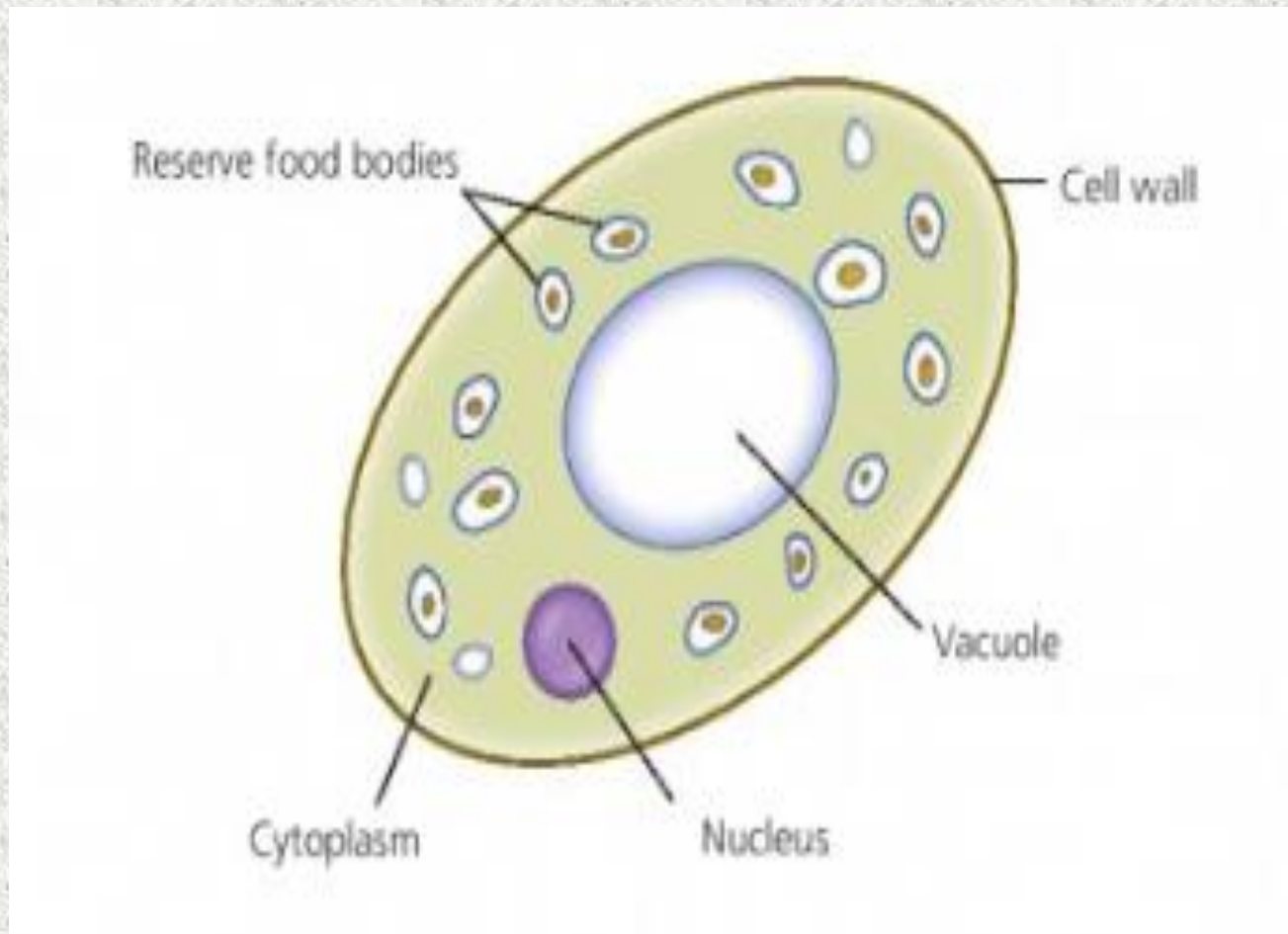
Method

- + and – strains grow close together.
- Swellings form along the length of the hyphae and touch.
- Nuclei move into each swelling, now known as **progametangia**.
- Cross-walls form to produce **gametangia**.
- The wall between the gametangia breaks down.
- **Fertilisation** occurs when two nuclei fuse. Many **diploid** nuclei form.
- A tough, resistant outer wall forms around the old gametangia, forming a **zygospore (2n)**.
- The parent hyphae die away and the zygospores are released.

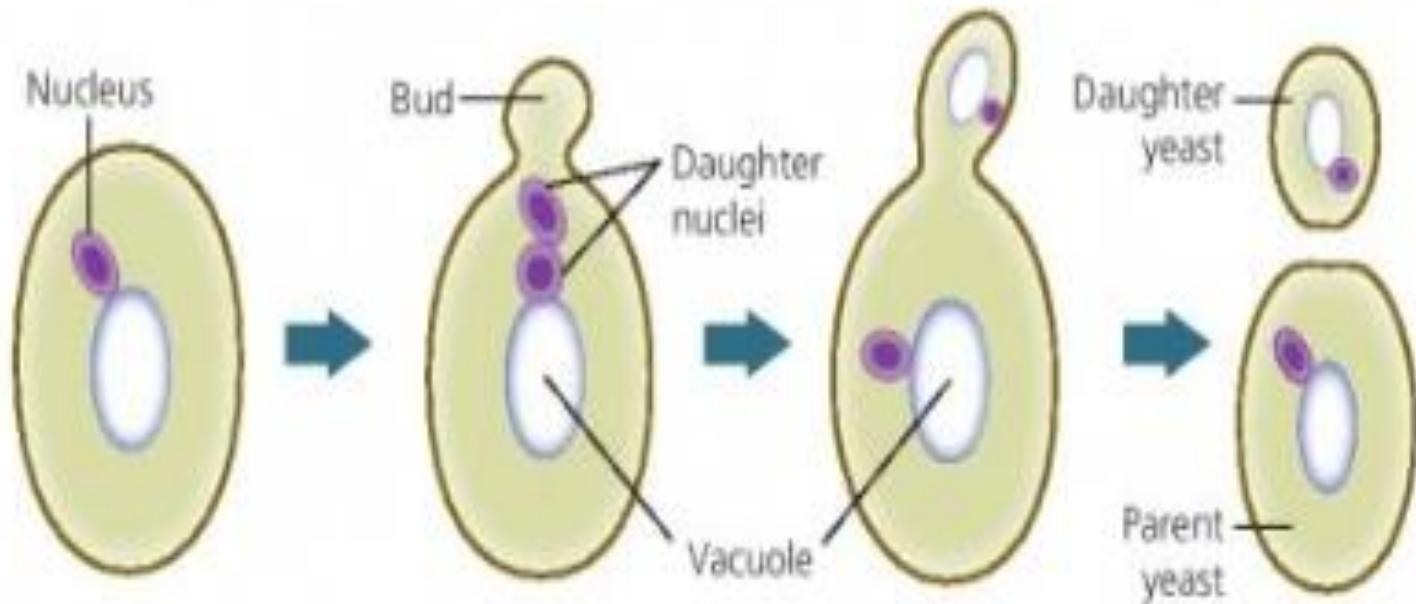
Yeast



Structure of yeast



Asexual Reproduction in Yeast (Main method- also known as budding)



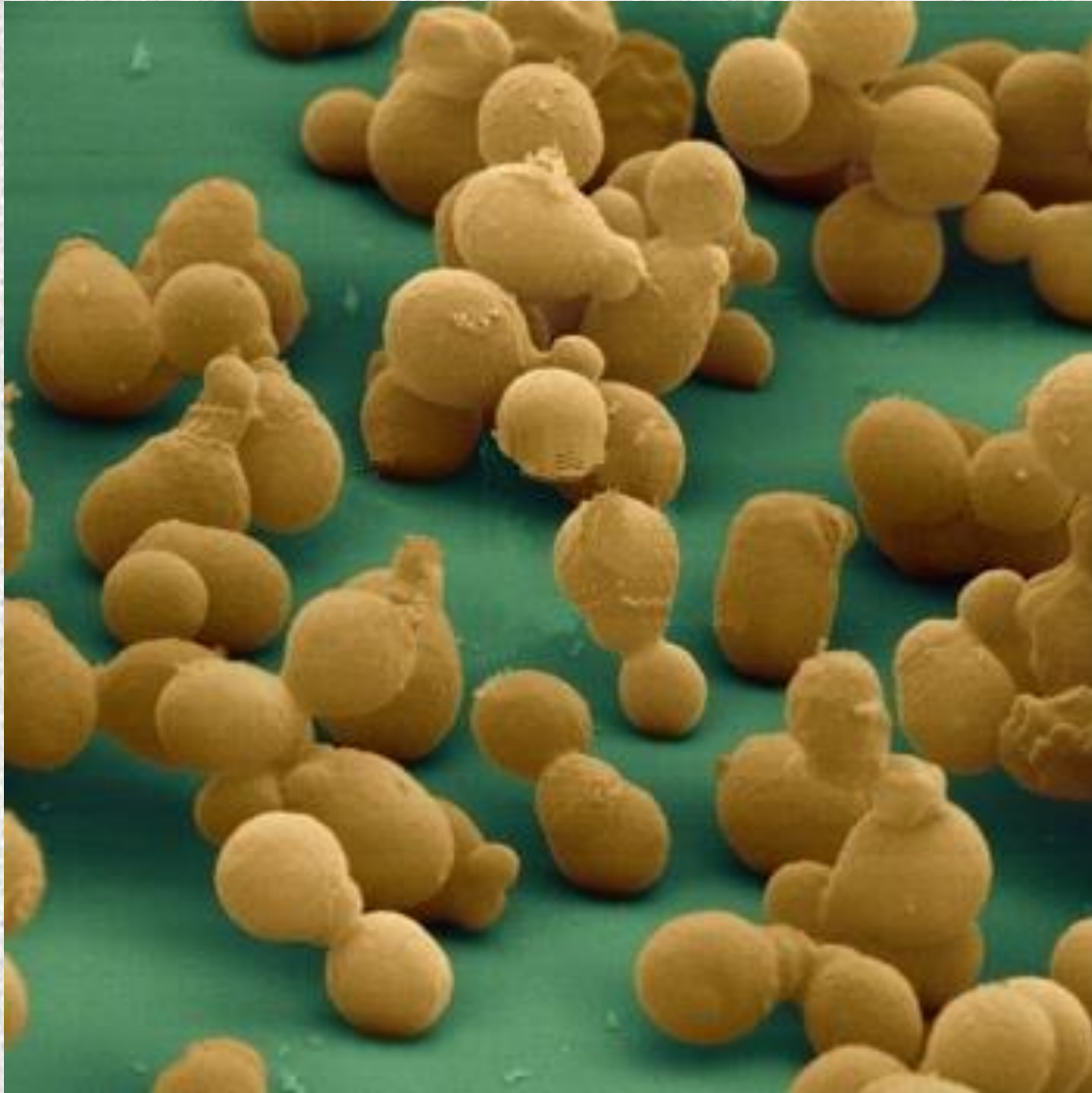
21.12 Budding in yeast

- In favourable conditions, a small extension (**bud**) forms on the cell.
- The bud enlarges and fills with cytoplasm.
- The parent cell nucleus divides by **mitosis**.
- The second nucleus moves into the bud.
- The bud will then grow and **may separate** from the parent cell.
- The new cell **may remain attached** and divide again, forming a **colony**.

Budding



Budding



Economic importance of fungi

Beneficial fungi

- Yeasts can be used to make bread and alcohols such as wine and beer
- Fungi can be used as a source of food e.g. mushroom



Economic importance of fungi

Harmful fungi

- Fungi can attack crops e.g. corn and wheat and cause major financial losses as a result
- Fungi such as athlete's foot and ringworm can infect animals
- Fungi can spoil food e.g. rhizopus grows on bread



Learning Check

- Can you draw the structure of yeast?
- Describe how yeast reproduces
- Give an example of how yeast is important economically

Contemporary issues and Technology

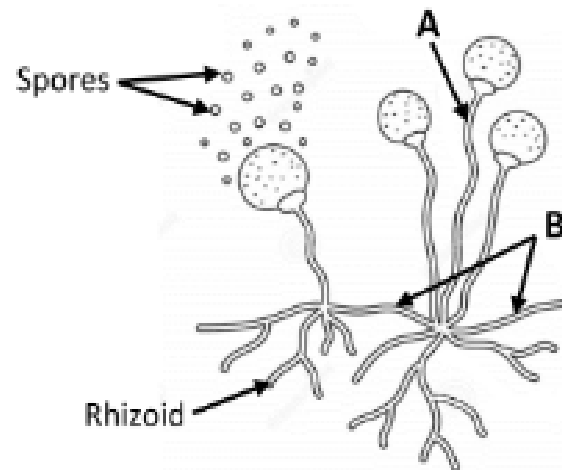
- Mention of edible and poisonous fungi.
- Economic importance of fungi: examples of any two beneficial and any two harmful fungi.

Practical Activities

- Investigate the growth of leaf yeasts using agar plates and controls

State exam

(a) The diagram shows an organism you have studied.



- (i) Name the organism shown in the diagram **and** the kingdom to which it belongs.
- (ii) Name the part labelled **A**.
- (iii) State the mode of nutrition used by this organism.
- (iv) Discuss the importance in nature of the type of nutrition named at part (iii) above.
- (v) Name the horizontal hyphae labelled **B** and state their role.
- (vi) Spores and rhizoids are labelled in the diagram. Give **one** function of each.
- (vii) Describe **one** environmental condition which may stimulate sexual reproduction in this organism.

Question 17 (a)	30
(i) Name: <i>Rhizopus</i> <u>or</u> bread mould	3
Kingdom: *Fungus (fungi)	3
(ii) Name the parts labelled A:	
*Sporangiophore	3
(iii) State the mode of nutrition used by this organism:	
*Saprophytic <u>or</u> *heterotrophic	3
(iv) Discuss the importance of this type of nutrition in nature:	
Decomposer <u>or</u> recycles minerals <u>or</u> described	3
(v) Name the horizontal hyphae labelled B and state their role:	
Name: *Stolons	3
State: Spreading the fungus <u>or</u> asexual reproduction	3
(vi) Give one function of:	
Spores: (Asexual) reproduction <u>or</u> dispersal	3
Rhizoids: Absorption <u>or</u> anchorage <u>or</u> secretion	3
(vii) Describe one environmental condition which may stimulate sexual reproduction:	
Drought <u>or</u> unsuitable temperature <u>or</u> named adverse condition	3