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enters inside the host through stomata and form intercellular mycelium.

- Within 5-6 days, the mycelium absorbs sufficient food and begins to aggregate near the surface of the infected organs and form a compact mass called Uredia. During late spring, the mycelium develop vertically erect, elongated, reddish-brown pustules or sori just beneath the host epidermis. These are called Uredosori. Each Uredosorus produce a single spore, at its tip, known as Uredospore.

- Each Uredospore is unicellular, binucleate ( $n+n$ ), oval or globose structure. It has thick wall composed of thick spiny exospore and smooth endospore. They are reddish or orange-red coloured which gives characteristic red-coloured rust on the affected part.

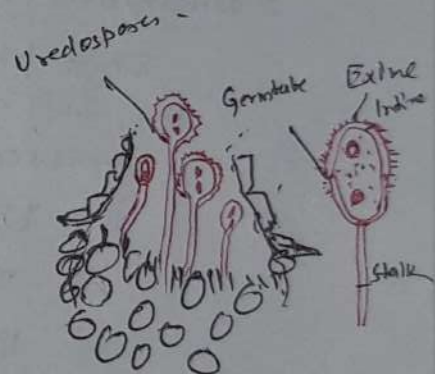


Fig. P. graminis: T.S. Wheat Leaf passing through Uredosorus

- Uredospores are swimmer spores of Puccinia and regarded as "conidia" which after germination gives rise to dikaryotic mycelium. This mycelium is capable of producing Uredospores again within 10-12 days of germination. This is why Uredospores are also known as repeating spores.

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b) Telial stage:-

• Towards the end of growing season, when environmental conditions become unfavourable for the dev. of Uredosporas Teleutospores are produced. First they develop within the same Uredosori, but later they develop in separate Sori known as - Teleutosori.

This stage is known as the black stage and hence the name 'black rust' is given to the disease.

• Each teleutospore is bi-celled, bi-nucleate, spindle shaped and thick walled structure. At maturity the two nuclei fuse to form a single diploid nucleus (2n).

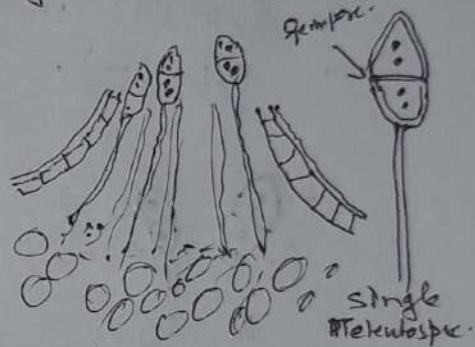


Fig. P. Ramani's show dev. of Teleutospore.

• The teleutospores are dormant ~~stage~~ spores and are unable to germinate immediately. They remain dormant on the dead host tissue or on soil till the next growing season.

c) Basidial stage:-

• After the resting period, the teleutospores germinate during spring and produce and erect tubular outgrowths from each cell. These are called Promycelium or epibasidium. The diploid cell of ~~the~~ each cell of teleutospore moves to the epibasidium. After one meiotic

## On Line study Material (e-content)

(5)

College: S.S. College, J'bad.

Department: Botany

Subject: Fungi

Topic: Lifecycle of Puccinia

Medium of Teaching: WhatsApp & college Web. site.

Date: 20.07.2020

Time: 11:00-12:00

Name of the Teacher: Dr. S.S. Sharma.

Class: B.Sc (Bot) P-I-H

Biotechnology P-I-Sat

### LIFE CYCLE OF PUCCINIA.

Lifecycle of Puccinia can be divided into two distinct phases depending upon the nature of mycelium. The two phases are -

1. Dikaryotic phase - on Primary host wheat
2. Monokaryotic phase - on sec. host barberry.

#### 1. Dikaryotic Phase on Wheat: -

This phase exist during the major part of the lifecycle. In this phase mycelium produces three types of spores i.e.

- a) Uredospores
- b) Teleutospores, &
- c) Basidiospores.

#### a) Uredial stage: -

This stage is formed by the infection of the aeciospores brought from the infected barberry plants or by the uredospores themselves coming from the neighbouring wheat plants infected earlier. Both the spores are binucleate and produce a germtube on wheat leaf after germination. The germtube

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Division four haploid nuclei are formed. Septa is laid down between the nuclei so that promycelium is divided into four cells with one nucleus each. This structure is called basidium.

A short lateral outgrowth known as sterigmata is developed from each basidium. At the tip of each sterigmata, a single, uninucleate haploid basidiospore is developed. out of the four basidiospores two are of one mating type (+) and the other two of different mating type (-).

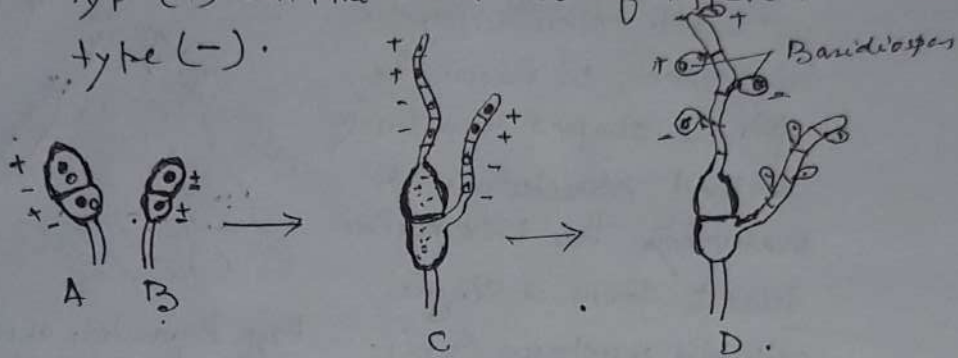


Fig. (A-D) *P. graminis tritici* : Basidial Stage.  
A - young teleutospore B - mature teleutospore  
C - germinating teleutospore D - Basidial stage

Basidiospores are unable to affect wheat plants. ~~It is a dikaryotic phase on barberry plant; at this stage, the haploid phase of life cycle is observed on wheat.~~ They ~~Basidiospores~~ are dispersed by wind and reaching the upper surface of barberry leaf ~~and~~ start germination. They germinate by giving out a germ tube which penetrates through the epidermis. Several basidiospores of different strains may infect the same barberry leaf. Thus, haplomycelium of two different strains ('+' or '-') is formed. It remains haploid for some <sup>time</sup> ~~hours~~.