MUSTARD

Brassica juncea L.

DISEASES OF MUSTARD

1. **White rust** : ***Albugo crucifearum***
   Old name: *Albugo candida*
2. **Downy mildew** : ***Peronospora brassicae***
3. **Alternaria blight** : ***Alternaria brassicae***
4. **Powdery mildew** : ***Erysiphe polygoni,***
   Erysiphe crucifearum

WHITE RUST

Albugo crucifearum

Albugo candida

1. White Rust

Obligate parasite causing systematic infection resulting in malformation of the inflorescences.

C.O. : *Albugo crucifearum*

Old name : *Albugo candida*

Class : Oomycetes

Order : Peronosporales

Family : Albuginaceae

Symptoms:

- **Local as well as systemic infections are noticed.**
- **Disease appear on leaves and characterized by the appearance of white creamy raised pustules on the under surface of leaves.**
- **Corresponding upper surface become yellow.**
- **Pustules rupture and released chalky dust of spores (sporangia).**
- **Systemic infection causes hypertrophy and hyperplasia on inflorescences and pods.**
- **Affected flowers show malformation.**

The appearance of white creamy raised pustules on the under surface of leaves

Corresponding upper surface become yellow

Hypertrophy and hyperplasia on inflorescences and pods.

- **Disease Cycle**

1. **Sexual cycle:**

- **Primary source:**

- The oogonia and antheridia are formed from the mycelium and oospore developed on fertilization of **anthredium** with **oogonium.**
- **Oospore** germinates and forms **zoospore.**

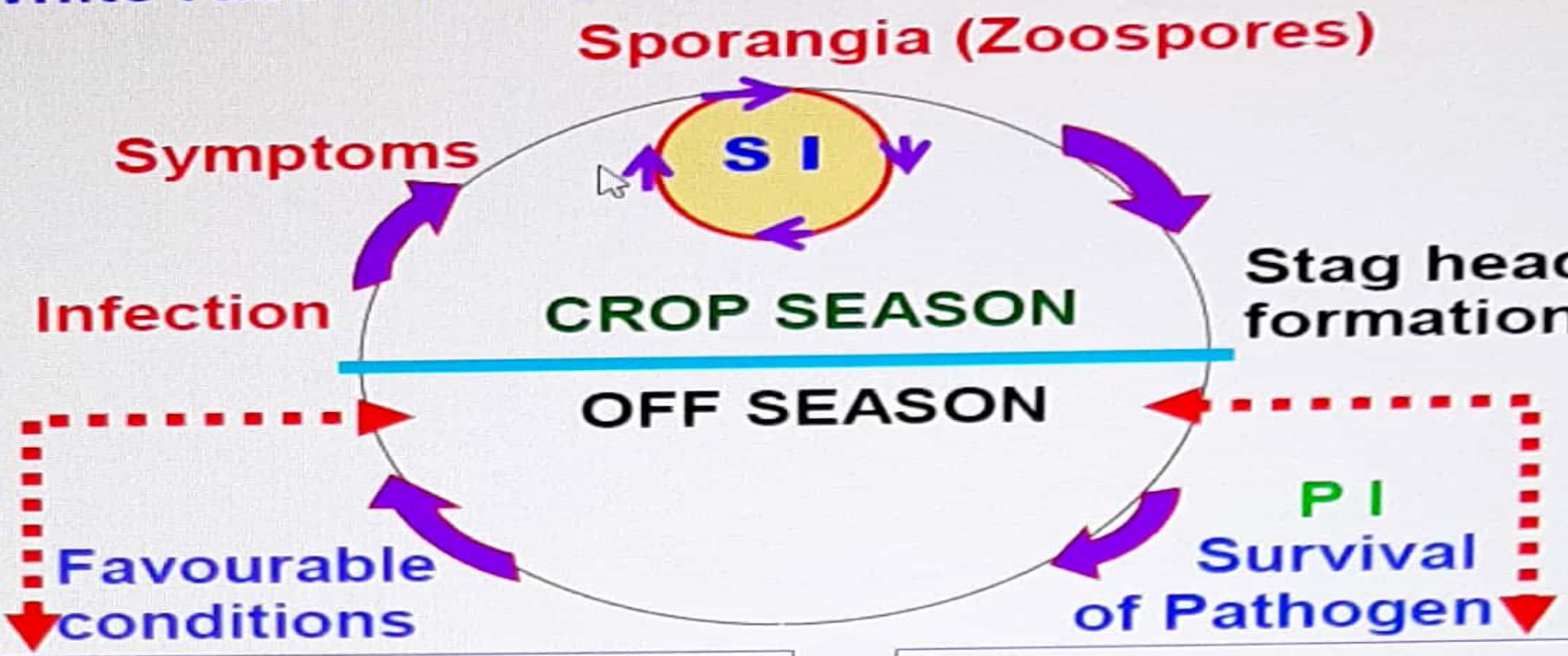
2. **Asexual cycle:**

- **Secondary spread:**

- **Sporangia** produce **biflagellate zoospore**.

DISEASE CYCLE:

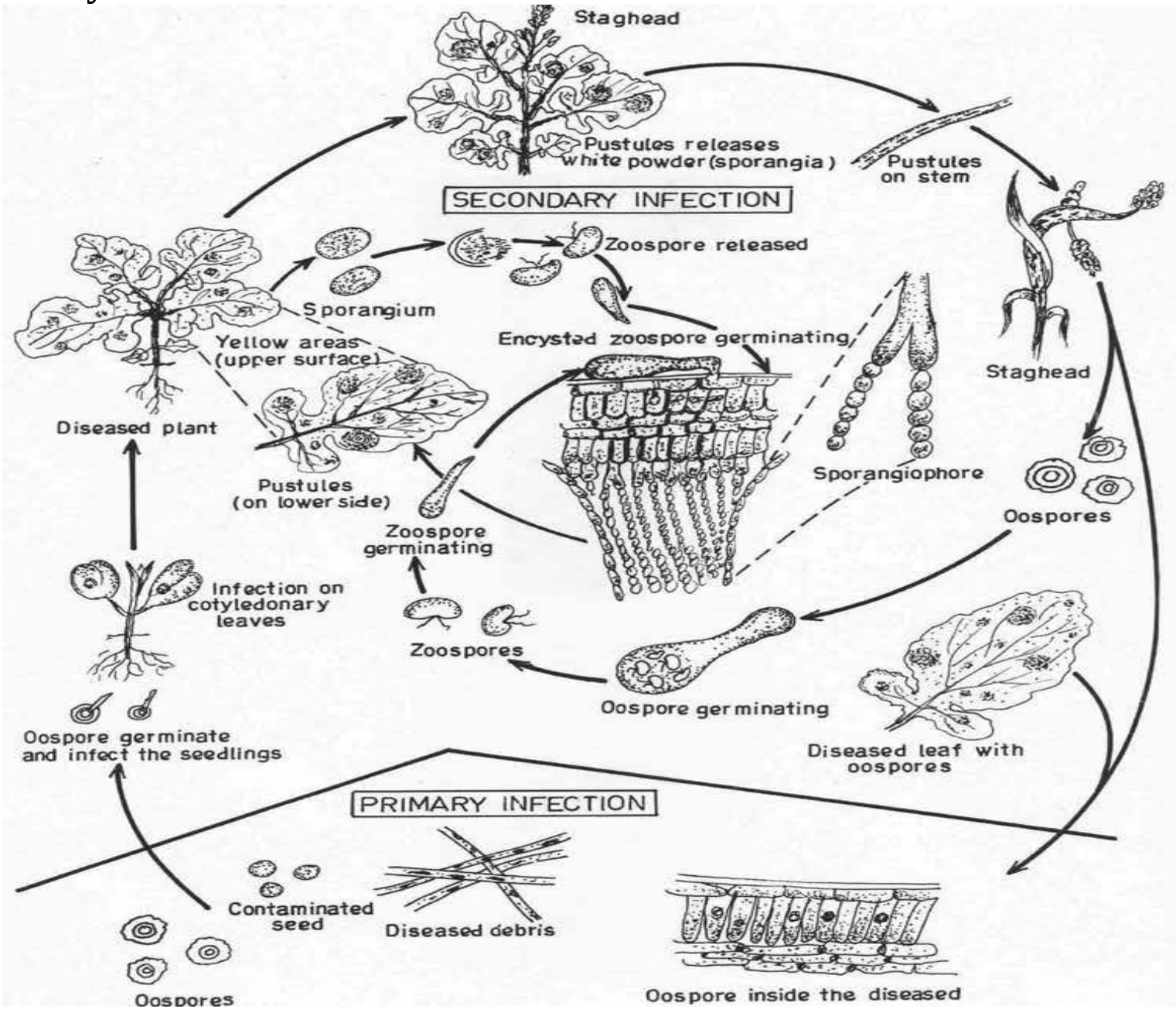
White rust of Mustard *Albugo crucifearum*



- Cool and humid weather
- Temperature 10-25^{0}C
- Relative Humidity > 80%
- Cloudy days
- Unseasonal rainfall during the crop season

- Seed borne & Soil borne
- Pathogen survive in the soil as Oospores (resting structure) for many years.
- P I by Oospores which germinate and penetrate into plant roots

Disease Cycle:



▪Favourable conditions:

➢**Oospore** survives under dry storage for **20 years**.

➢Rain coupled with relatively low humidity.

▪Management:

➢Spray mancozeb @ 0.25 % @ 27 gram in 10 liter water or metalaxyl or chlorothalonil 0.2 %. Second spray should be done after 15 days.

➢**Crop rotation with non-cruciferous crops should be followed.**

Downey Mildew

Peronospora brassicae

2. Downy mildew

C.O. : *Peronospora brassicae*

Class : Oomycetes

Order : Peronosporales

Family : Peronosporaceae

Symptoms:

- **It is common among young plants, but also appears on mature plants.**
- **The disease is characterized by the appearance of purplish-brown spots on the underside of the leaves.**
- **The spots may remain small or become enlarged.**
- **The upper surface of the leaf on the lesion is yellow.**
- **Sometimes white rust is also found side by side on the same leaf and the symptoms of the two look very much similar from a distance.**
- **The stem also get infected and swell up with malformed siliques.**

Yellow irregular or tan coloured spots on the upper surface

Mycelial growth purplish brown spots on the under surface

Infected stem swell up with malformed siliques

Disease cycle:

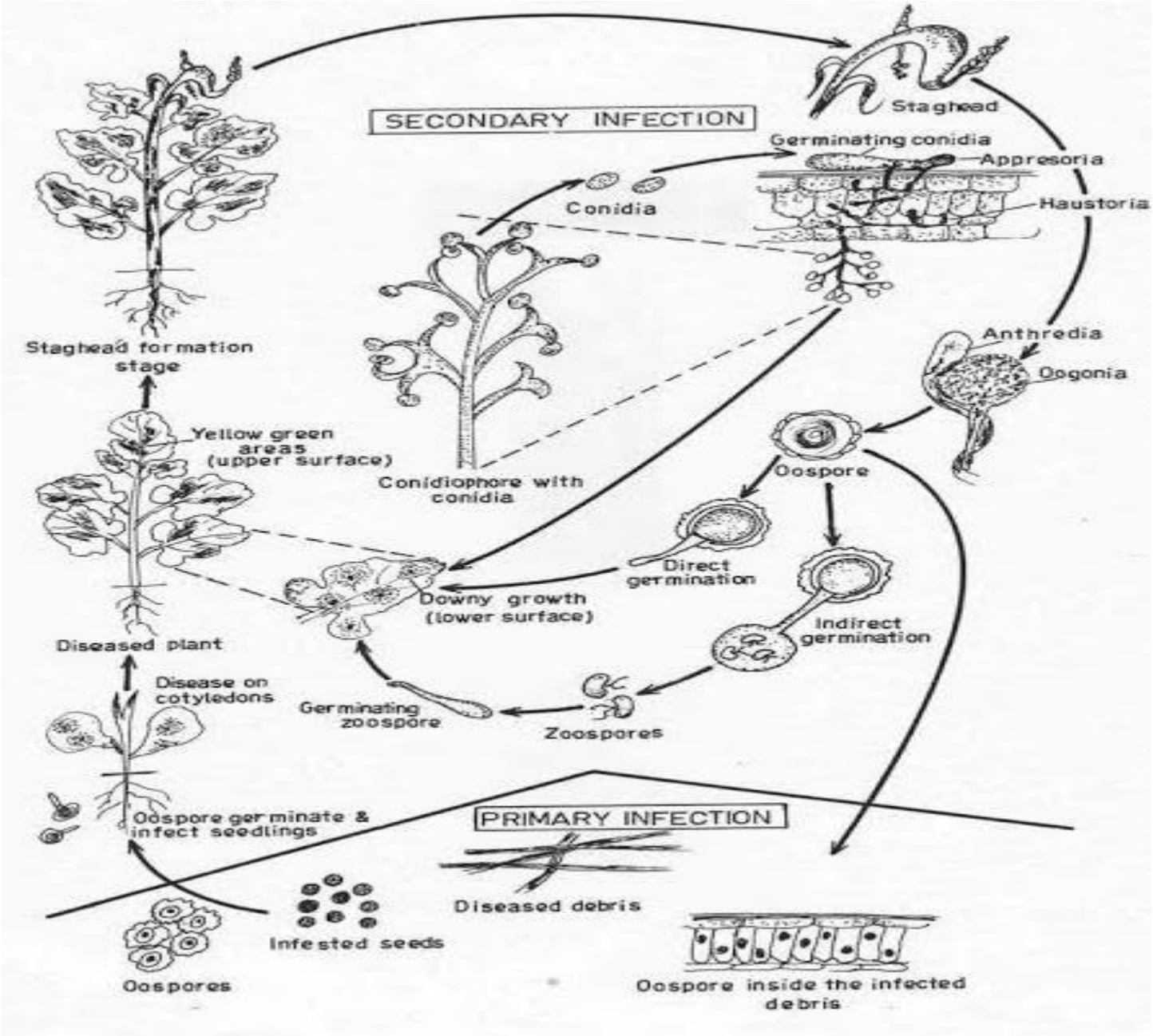
- **Primary source: The pathogen survives in the form of oospores in the soil. Contaminated Seeds also act as source of inoculum. The co-lateral hosts plays important role in perpetuation of pathogen.**
- **Secondary spread: Through sporangia containing zoospores.**

- **Host: Turnip, Radish, Cabbage, Cauliflower and *Brassica* spp.**

Management:

- **The weed hosts of the pathogen should be eradicated.**
- **Crop sanitation- removing and burning the diseased leaves/ shoots etc.**
- **Deep ploughing in summer.**
- **Spray 0.8 to 1.0% B.M. or Metalaxyl M-Z 0.2% after initiation of the disease.**

Disease cycle:





ALTERNARIA BLIGHT

Alternaria brassicae

C.O. : *Alternaria brassicae*

Class : Dothideomycetes

Order : Pleosporales

Family : Pleosporaceae

Symptoms:

- **Irregular lesions surrounded by chlorotic haloes are produced on the leaves and petioles.**
- **The spots get enlarged to cover the entire leaf blade with girdling the petiole to cause blighting of the leaves.**
- **Entire foliage get blighted.**
- **Seeds get shriveled and content low oil.**
- **Grain yield is reduced.**

Disease cycle:

- **Primary source: Infected leaf debris serves the pathogen to perpetuate.**
- **Secondary spread: Through wind borne conidia.**

Favorable condition:

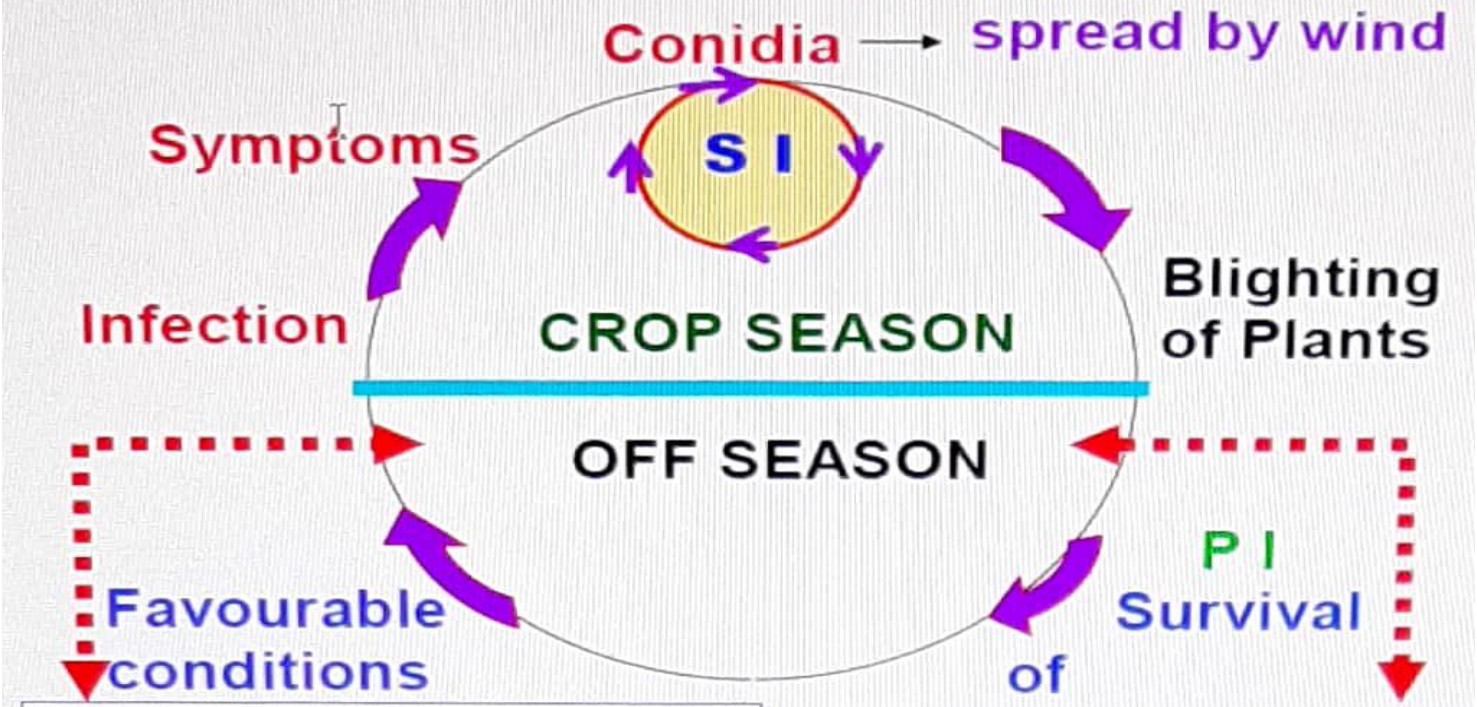
- **Cool and dry weather.**
- **Temperature 10-15^0 C.**
- **R.H. 80% & above.**

Management:

- **Spray chlorothalonil @ 0.25 % or mancozeb 0.2%.**
- **Spray brestan 0.05% after initiation of disease and repeat after 15-20 days.**
- **Remove the infected plant debris and destroy it .**

DISEASE CYCLE:

Alternaria blight of Mustard



- Temperature 20-25^{0}C.
- Relative Humidity > 80 %
- Unseasonal rainfall during the crop season

- Pathogen is seed-borne
- Pathogen survive in infected plant debris in soil

Powdery Mildew

Erysiphe polygoni, Erysiphe crucifearum

4. Powdery Mildew

C.O : *Erysiphe polygoni*

: *Erysiphe crucifearum*

Class : Leotiomycetes

Order : Erysiphales

Family : Erysiphaceae

Symptoms:

- **Appear in the form of dirty-white, circular, floury patches on both sides of leaves and pods.**
- **Leaves surface covered with powdery growth of fungus resulting in drying.**
- **Affected plant produce small and shriveled seeds.**

Favourable conditions:

- **Dry weather**
- **Temp. 25 ^{0}C**
- **Low humidity (65 %)**

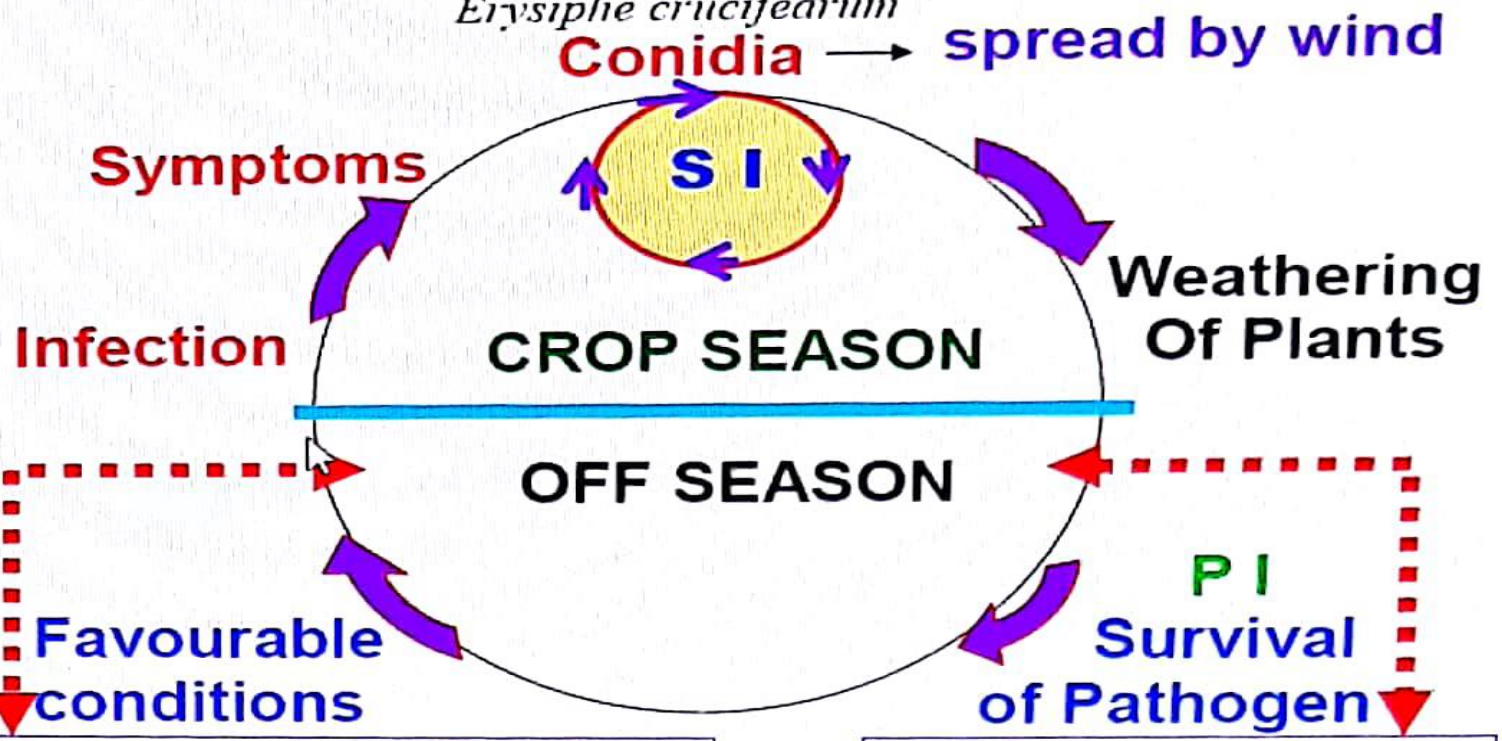


White powdery growth of fungus on upper surface leaves

Lower surface

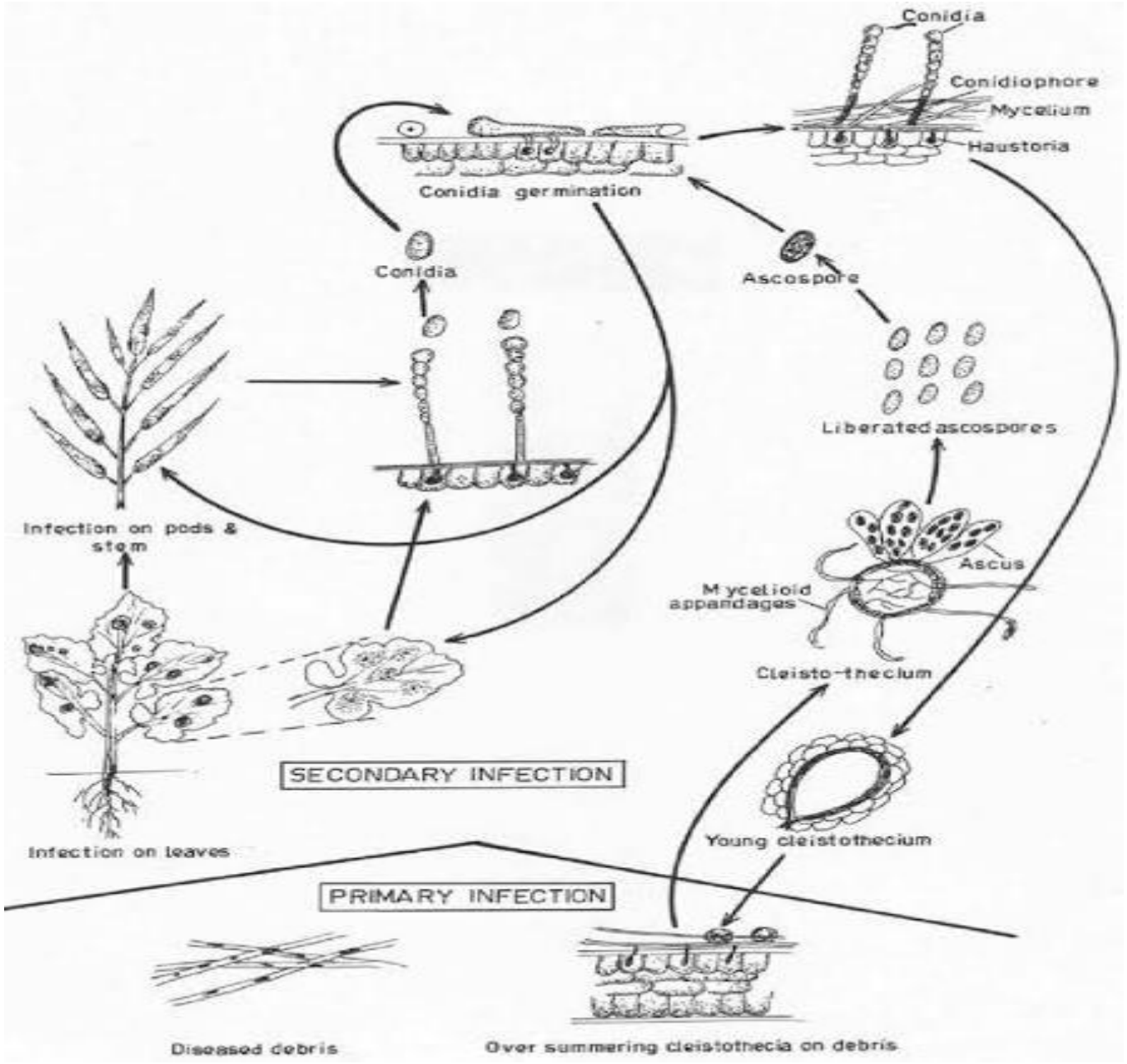
DISEASE CYCLE:
Powdery mildew of Mustard

Erysiphe crucifearum



- Temperature 20-25^{0}C.
- Relative Humidity > 80 %
- Unseasonal rainfall during the crop season

- Pathogen survives on collateral hosts & also in infected host tissues as Cleistothecia


Conidia
Conidiophore
Mycelium
Haustoria
Conidia germination
Conidia
Ascospore
Liberated ascospores
Infection on pods & stem
Ascus
Myceliod appendages
Cleisto-thecium
SECONDARY INFECTION
Young cleistothecium
Infection on leaves
PRIMARY INFECTION
Diseased debris
Over summering cleistothecia on debris

Disease cycle:

- **Obligate parasite and mycelium is ectophytic.**
- **Primary source: Cleistothecia produces globous asci. Each ascus produces 2 to 6 ascospores**
- **Secondary spread: conidia -disseminated by wind.**

Management:

- **Spray Karathane @ 0.07 %**
- **Spray Wettable sulphur, Sulfex or Thiovet @ 0.3%**