



B.Sc. Third Year, Semester - V
Botany Paper No. XVI (C)

Plant Pathology Unit-2

1) Cereals

c) Ergot of Bajra



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c) Ergot of Bajra

Causal Organism: *Claviceps fusiformis*

Host: *Pennisetum typhoides* (Bajra)

- **Classification**

- **Division-** Mycota
- **Sub Division-** Eumycotina
- **Class-** Ascomycota
- **Sub class-** Hypoceromycetidae
- **Order-** Hypocreales
- **Family-** Clavicipitaceae
- **Genus-** *Claviceps*
- **Species-** *fusiformis*



Distribution

This disease reported from many parts of Africa and India. In India the first outbreak of the disease causing considerable loss were reported from Satara District of Maharashtra in 1956. It is increased during the past few years in Maharashtra and Karnataka, causing severe damage to the crop and poison to cattle which consume ergot along with the straw. The damage caused by the disease depends upon the weather at the time of ear formation. Presences of the toxic alkaloids in the ergot add to the importance of the disease. Bajra ergot contains agroclavine, elymoclavine, chanoclavine, penniclavine and setoclavine. Besides above, a water soluble alkaloid ergometrine is also present. Total amount of alkaloids in honeydew and sclerotia has been found up to 5 mg/g and 56 mg/100g respectively.

Symptoms:

Ergot first appears as a viscous, turbid, and fluid oozing out as small droplets from the infected florets of the panicles. This carbohydrate-rich fluid contains numerous conidia of the pathogen which is called as honeydew phase of the ergot symptoms. The honeydew can be initially cream coloured, later becoming pink or brown. The honeydew phase persists for 4-7 days, when it may flow down the panicle on to leaves or the ground. Later the fluid becomes darker covering larger areas of the panicle. Within 10 days of honeydew formation sclerotia are formed in infected florets instead of grain. They can be seen projecting from between the glumes. Sclerotia are initially whitish, elongated and larger than seeds. The sclerotia becomes hard and brown to dark brown within 10-15 days. The sclerotia are about 0.5 to 1.0 cm in length, 1-2 mm in diameter.



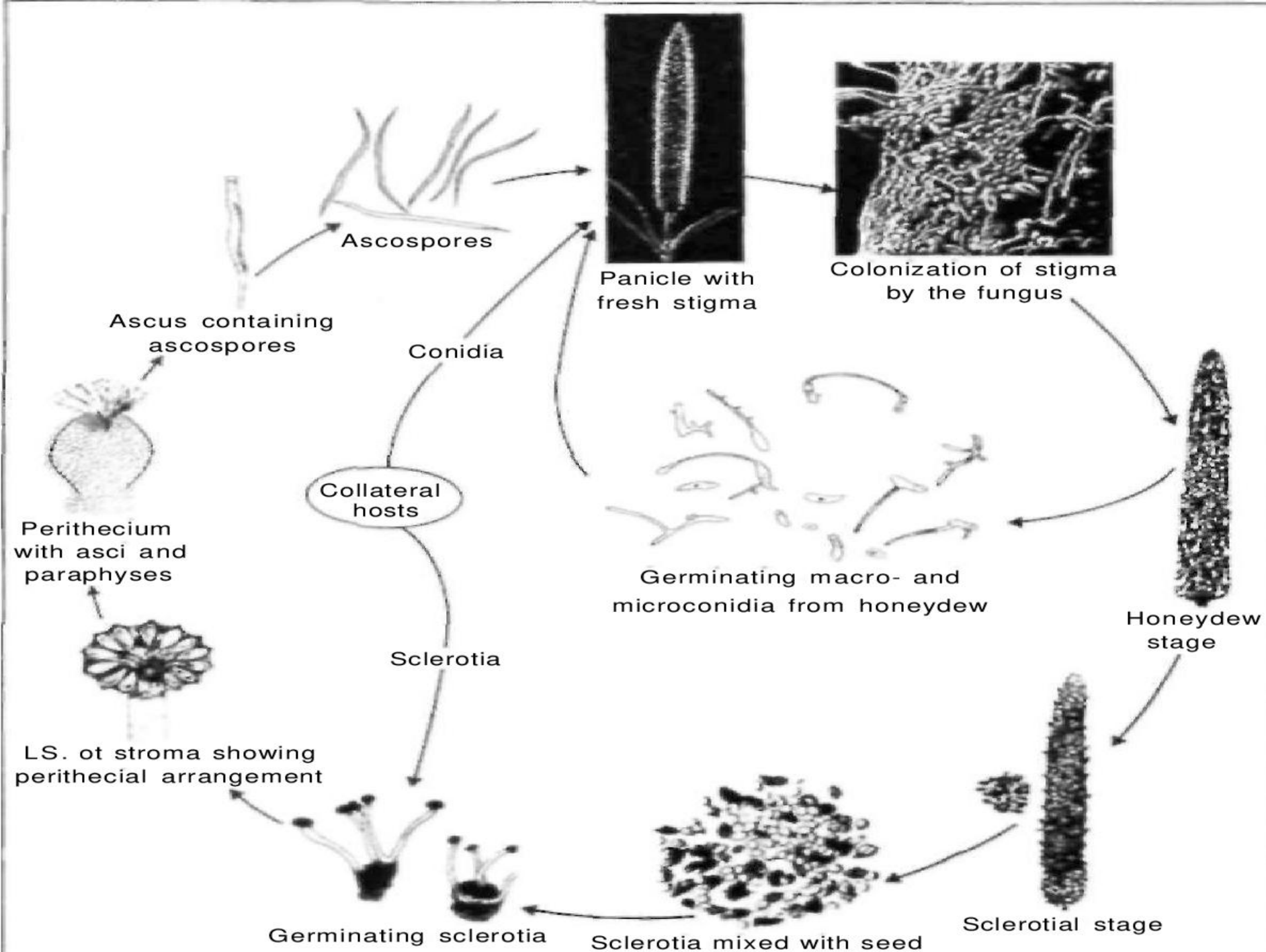
Causal organism and disease cycle:

The disease is caused by *Claviceps fusiformis*. The honeydew produced on the ears is the conidial stage. Two types of conidia are produced. Macroconidia are developed initially are hyaline, unicellular, fusiform and measure $13-18 \times 3-4 \mu\text{m}$. later microconidia are formed which are unicellular, hyaline, globular and measure $2.5-10 \times 1.2-4.8 \mu\text{m}$. Macroconidia germinate by producing one to three germ tubes while microconidia produces one germ tube. These germ tubes may produce secondary conidia which may further form tertiary ones. Conidia are infective and spread disease in the field. Later sclerotia begin to develop by replacing the grains. Sclerotia are round to elongated, light to dark brown, hard to brittle and measure $3.6-6.1 \times 1.3-1.8 \mu\text{m}$. sclerotia germinates by producing one to several fleshy, 6-26 mm long purplish stipes which bear light to dark brown globular stromata. The stromata bear many numerous perithecia. The perithecia are pear-shaped, arranged in semicircular manner in the stromata. Their neck is protruding and has an ostiole.

Causal organism and disease cycle:

There are numerous, long, cylindrical, hyaline, thin walled asci in each perithecium. Asci are interspersed with paraphyses and emerge through ostiole. Each ascus contains eight ascospores which are long, hyaline, filiform, non septate and measure $103-176 \times 0.5-0.7 \mu\text{m}$. ascospores germinates to produce primary and secondary conidia. Conidia are disseminated to healthy inflorescence by physical contact with infected heads, splashing rain, air currents and insects.

The primary source of inoculum is the conidia left in the field from the previous crop. Sclerotia may also be mixed with seeds. Such seeds sown in the next season also bring sclerotia in soil. In some cases, conidia from ergot infected collateral hosts also served as source of primary inoculum. Sclerotia germinate to produce perithecial stroma. Ascospores released from perithecia are carried by air currents to fresh flowers at the Perigyny stage under favourable weather.



Control measures:

- 1) Since the pathogen is air borne, affecting the spike only at the time of flowering, it is difficult to control. Perhaps the best method is to develop resistant varieties, and work needs to be done in this direction.
- 2) The most common method of control of ergot is the use of clean seeds. Deeping the seeds in 20-32 percent salt solution float the sclerotia which can be removed by hand. Sprays with Ziram or a mixture of copper oxychloride and Zineb (1:2) applied and 2-3 times at weekly intervals, starting prior to earhead emergence gives good protection.
- 3) According to Kulkarni (1967) sclerotia remain viable for a longer time if buried deep.
- 4) Therefore repeated ploughing may reduce their viability. Cultural practices such as deep ploughing, adjustment of sowing dates, balanced soil fertilisation and intercropping for disease control are recommended.

Thank you