

Barley Crop Protection

Barley is low input crop can also be grown in marginal lands. In India, barley is cultivated on about 6.95 lakhs ha. The major barley growing states in India are Rajasthan, Uttar Pradesh, Haryana, Punjab, Madhya Pradesh, Uttarakhand, Himachal Pradesh, Bihar, Jammu and Kashmir, West Bengal, Chhatishgarh and Sikkim. Among states, Rajasthan occupied the highest area and production of barley, followed by U.P. and Haryana.

Barley is attacked by various diseases and insect pests causing heavy losses in yield and quality. Though barley is attacked by many pathogens but few are economically important in India. Stripe rust / yellow rust (*Puccinia striiformis* f.sp. *hordeii*) and leaf rust/ brown rust (*Puccinia hordei*) are major problems in North Western Plain Zone (NWPZ), while in North Eastern Plain Zone (NEPZ) leaf rust and leaf blights are common. In Hill Zone (NH), stripe rust and powdery mildew are serious problems.

Stripe or yellow rust

Causal organism: *Puccinia striiformis* f.sp. *hordei*

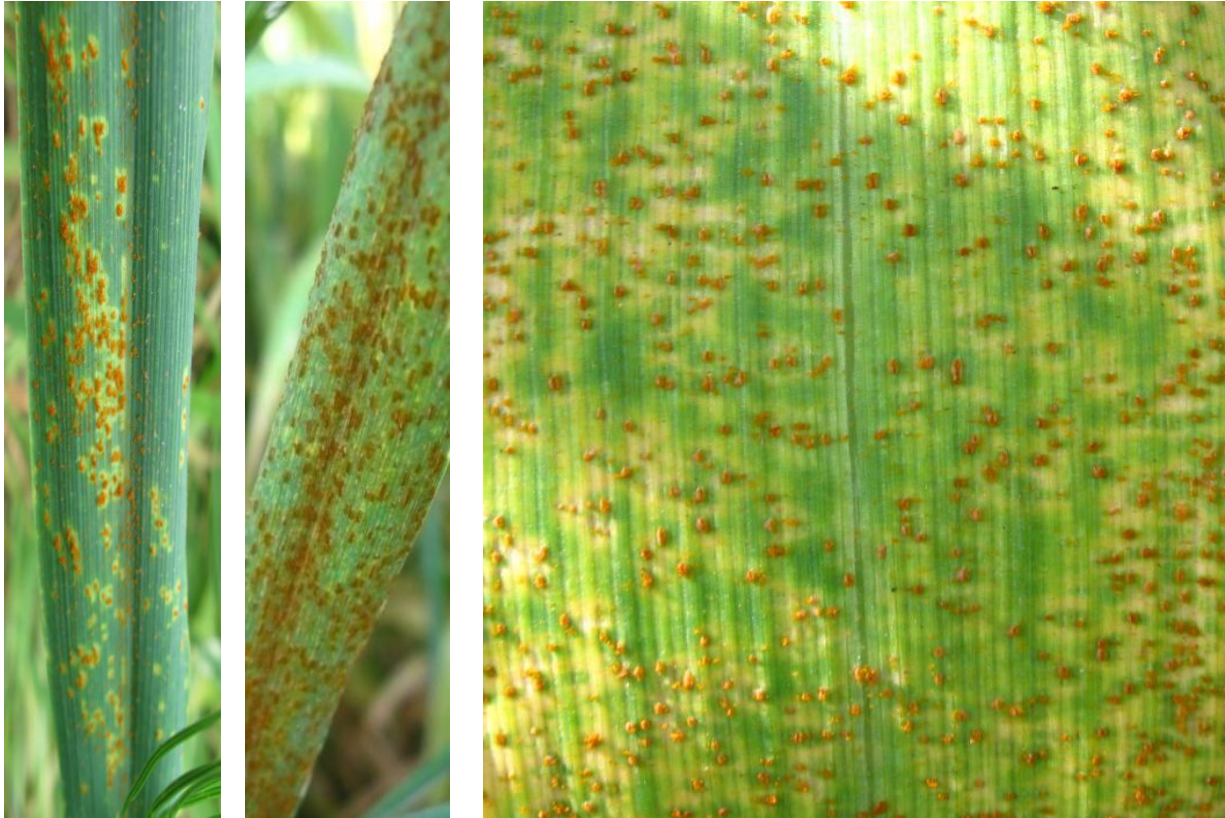
Symptoms: Infection produce linear, orange-yellow pustules appear on leaves and/or heads. As the disease progresses, pustules coalesce to form long stripes between leaf veins. Spores rub off easily on fingers.



Leaf Rust

Causal organism: *Puccinia hordei*

Symptoms: Small orange brown circular spore masses surrounded by a bleached or yellow halo.



Black Rust

Causal organism: *Puccinia graminis* f.sp. *hordei*

Symptoms: Dark red brown spore masses on the stem and leaf sheath. In severe case, spores can form on leaf blade, glumes and awns.



Spot Blotch

Causal organism: *Bipolaris sorokiniana*

Symptoms: On leaves, dark brown round or elongated spots that may join into larger irregular patches. Both spots and patches surrounded by yellow halo. Severely affected leaves die and dry up, leaving the characteristic brown lesions visible.



Net Blotch

Causal organism: *Pyrenophora teres*

Symptoms: A characteristic "netting" of the dark, chocolate-colored blotches on leaves, sheaths and glumes



Powdery Mildew

Causal organism: *Blumeria graminis* f.sp. *hordei*

Symptoms: White to buff or gray powdery masses of spores scattered on or completely covering the leaf blade. All above ground parts of the plant can be affected.



Loose smut

Causal organism: *Ustilago nuda*

Symptoms: Masses of olive brown smut spores replace the entire head of plants with little development of floral bracts and awns. Spores are dislodged and scattered by wind when the delicate membranes surrounded them break. The fungus infects open flowers and becomes established in the embryo of the seed.



Covered smut

Causal organism: *Ustilago hordei*

Symptoms: Masses of dark brown smut spores replaced the entire head of plants. Floral bracts and awns at least partially develop and spores are contained in a membrane until plant maturity when they are dislodged by threshing and infect the seed.



Barley Yellow Dwarf Virus

Symptoms: The virus is transmitted by several species of aphids, and symptoms can occur in patches. Bright yellow tips and margins of older leaves. Stunting, small seed and sterility.

Integrated Disease Management

- Grow resistant or tolerant varieties.
- Use disease free seed.
- Seed treatment with Carbendazim 50% WP or Carboxin 75% WP @ 2g/kg seed.
- Apply the balanced fertilizers as per recommendations.
- Rogue the loose and covered smut infected plant and burn.

AICW&BIP – Barley Network

Under AICW&BIP, barley entries are screened under various nurseries viz., Initial Barley Disease Screening Nursery (IBDSN), National Barley Disease Screening Nursery (NBDSN) and Elite Barley Disease Screening Nursery (EBDSN) for resistance against various diseases, aphid and CCN in different cooperating centers.

Presently, 15 coordinated centers are involved in disease/ pest evaluation under AICW&BIP representing all barley growing zones. Each centre has specific responsibility for screening the different nurseries under barley network. Experiments on chemical control of rusts and blight have also been conducted at various hot spot locations to evaluate various fungicides for management of diseases.

Pathotypes analysis and seedling resistance test are carried out at IIWBR Regional Station at Flowerdale. The centre is responsible for maintenance and regular supply of pathotypes of three rusts of barley in addition to identification/ pathotyping of races from samples collected during the crop seasons across the country.