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**Course name :**

**Crop Production Technology-II  
(ASAG 2204)**

**Course credit :**

**(2-1-0)**

**Lecture 4**

**Topic: Barley**



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## 4.1 Barley

**Scientific name : *Hordeum vulgare***

- It is the most important cereal grain crop after rice, wheat and maize.
- In India the crop is cultivated as summer crop in temperate regions and as a winter crop in tropical regions.
- Good drought tolerant crop
- It is mainly used as live stock feed and in now a days it is used for human consumption( barley malt).
- Generally, barley is cultivated as rabi season crop in India.
- Used as food, forage, feed , malt and fuel



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## **4.2 ORIGIN:**

Barley is believed to be originated from in Abyssinia ( Ethiopia) and south east asia.

## **4.3 Producing countries:**

USSR, Canada, France, Spain, UK, Germany, Australia

## **4.4 Producing states :**

Rajasthan, U.P, M.P, Harayana, Punjab, West Bengal. J&K, Bihar, etc.,

## **Local names:**

Barley ( english, telugu, kanada, malyalam)

Sattu ( marathi)

Jau ( Hindi)



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## 4.5 CLASSIFICATION

Aberg and Wiebe (1946) classified all the cultivated barley varieties into three distinct species based on the number of rows of grain and their arrangement:

- (a) *Hordeum vulgare*-six-row barley
- (b) *Hordeum distichon*-two-row barley
- (c) *Hordeum irregular*-two-row barley

## 4.6 SOILS:

It is grown successfully on all the soils where wheat can be grown.

Good drained soils are good.

PH range is – 6.5-7.8

It is more tolerant than other cereal crops in alkaline soils and less tolerant to acid soils.



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## 4.7 TEMPERATURE

Barley will germinate at temperature of 2<sup>0</sup> C but emergence is low at this temperature. Barley crop is grown as summer and winter crop, but the main crop is in rabi season.

It requires temperature of 12-16 <sup>0</sup>C at growing stage and 30-32 <sup>0</sup>C at ripening stage.

## 4.8 BOTANICAL DESCRIPTION

Barley (*Hordeum spp.*) belongs to *Gramineae* family. The barley plant very much resembles the wheat plant and usually grows 0.75 to 1 metre in height. The botanical description of main parts of barley plant is given below:



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## 4.8.1 Root System

It consists of shallow and deep roots. The shallow roots arise near the soil surface and spread out laterally about 15-30 centimetre almost at right angles to the tillers. The deep roots extend downwards into deep layers of soil. The depth of penetration varies from 0.75 to 150 cm.

## 4.8.2 Stem (Culm)

The stem is cylindrical and possesses five to seven hollow internodes separated by solid nodes, at which the leaves arise. The internodes are short at the base of the plant and the length increases from the base of the culm upwards. The nodes may be either exposed or hidden by the sheath depending on the kind of barley variety. The usual number of tillers per plant varies from two to five.



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### 4.8.3 Leaves

Leaves arise from nodes of the stem and are borne alternately on opposite sides of the stem. Each leaf consists of a sheath, blade, ligule and auricle. The leaves of barley are usually broader and of lighter green colour than wheat. The leaf sheath is generally glabrous, but in a few varieties it is covered with hairs. The leaf blade is lanceolate linear. They possess small ligule (0.5 to 3 millimetre). Auricles are very conspicuous, which partly or entirely clasp the stem and are much larger than those in wheat. The surface of leaf is rough. Two-rowed barleys have narrower leaves than six-rowed barleys.



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## 4.8.4 Inflorescence

The inflorescence is called spike or head. The spike at the top of the stem consists of spikelet's attached at the nodes of a zigzag rachis. Each spikelet has two glumes and a floret. Three spikelet's are attached at each node of the rachis. In two-rowed barleys only the central spikelet is fertile, whereas in six-rowed barleys all the three spikelet's are fertile. the flower by swelling during pollination. Barley is a normally self pollinated crop.



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## 4.8.5 Kernel (Grain)

The grain of barley is a caryopsis consisting of lemma, palea and a rachilla. In most of the barley varieties the lemma and pales adhere to the caryopsis, whereas in others (naked barley) they are free and the caryopsis threshes out like wheat. The caryopsis is composed of the pericarp, endosperm and embryo.





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# 4.9 VARIETIES

**These are some important varieties are given in below**

Variety	Maturity period (days)	Yield potential	Specific features
RD-2552	135-139	50-55	Resistant to yellow rust, blight and aphids. Medium tall (95-100 cm)
RD-2508	134-138	40-45	Resistant to yellow rust, blight and aphids. Medium tall (92-100 cm)
RD-2503	135-137	45-50	Resistant to yellow rust and susceptible to blight and aphids. Medium tall (100-105 cm)
Pragati (K-508)	135-139	38-42	Moderately Resistant to yellow rust, blight and aphids. Medium tall (100-105 cm)
K-603	137-139	43-48	Moderately Resistant to Aphids. Medium tall (100-105 cm)
DWR-28	120-140	40-43	Resistant to yellow rust and Blight Moderately Resistant to molya disease, dwarf (80-100 cm)



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**A number of promising barley varieties have been evolved for cultivation under different production zones. **5.9.1 Zone/Region Varieties****

**North Western Plains Zone (NWPZ) ; Punjab, Haryana, Western U.P, Rajasthan and some parts of Madhya Pradesh**

RD-2552, RD-2035, RD-2508, RD-2503, PL-426, K-508, K-226, DWR-28, K-1149

**North Eastern Plains Zone (NEPZ) ; Bihar, Orissa, West Bengal**

RD-2503, RD-2552, RD-2508, K-508, K-603, K-560, BCU-73, DL-36, K-551, K-1149

**North Hills Zone (NHZ) ; Himachal Pradesh, Uttaranchal, Hills of J & K BHS-169, HBL-113, HBL-316, HBL-276, Himani, Dolma, Son VLB-1**



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## 4.10 CROPPING SYSTEMS

Barley being a short duration crop is more suitable than wheat and other cereal crops for late sown conditions under limited inputs of irrigation and fertilisers. The crop can be grown successfully after the harvest of paddy, cotton, *Kharif* fodder, groundnut etc. Barley is included in following common cropping systems.

1. Rice-barley
2. Maize-barley
3. Sorghum-barley
4. Cotton-barley
5. Pearl millet-barley
6. Groundnut-barley
7. Blackgram-barley
8. Moong-barley
9. Cowpea-barley
10. Clusterbeam (Guar)--barley

Barley is grown mixed with crops like chick pea, mustard, linseed etc.



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## **4.10.1 LAND PREPARATION :**

Land should be prepared to fine tilth stage and weed free by giving 2-3 ploughings with cultivator followed by planking.

Seed treatment is advisable in barley to prevent smut.

Treat the seeds with bavistin @2 gm/ kg seed, vitavax 2.5 gm per kg seed.

250 ml formathion in 5 litres water for 100kg seed-termites

## **4.10.2 METHODS OF SOWING :**

Seed drill, is more effective

### **Sowing time**

- Mid- october to mid- november – irrigated
- 2<sup>nd</sup> fortnight of october – rainfed



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1<sup>st</sup> fortnight of January- if sown after *kharif* rice.

Seeding time	Seed rate ( kg/ha)	Time of sowing	Spacings	Seeding depth
Irrigated timely sown	75-80	10-25 nov	20-22.5	4-5cm
Late sown irrigated	100	25 nov - 15 dec	15-20	4-5 cm
Rainfed timely sown	80-100	15 -30 oct	22.5-28.5	5-7cm



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## 4.11 Fertilizer and manures

Manures and fertilisers both play important roles in barley cultivation. When barley is grown as an irrigated crop, about 10-15 tonnes of compost or farm yard manure could be applied about a month before sowing

situation	N (Kg/ha)	P(Kg/ha) basal	K (Kg/ha) basal
irrigated	60	30	30
Rainfed ( hills)	40	20	20
Rainfed ( plains)	30	30	20
Saline soils	60	30	30
Malt barley	80	40	30



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## 4.12 WEED CONTROL

2, 4-D sodium salt (80 per cent) or 2, 4-D amine salt (72 per cent) at 0.75 kg a.i. per hectare in 700-800 litres of water per hectare, 35-40 days after sowing of the crop.

Under rainfed conditions the rate of herbicide should be slightly lower, i.e., 0.5 kg a.i. per hectare.

For the control of Phalaris minor and wild Qat (*Avena fatua*) spray Isoproturan 75 WP at the rate of 1.0 kg a.i./ha or Pendimethalin (stomp) 30 EC at the rate of 3.3 litres in 600-800 litres of water 2-3 days after sowing.



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## 4.13 INSECT PESTS

### Soil Insects

There are a number of soil insects that damage the crop soon after sowing. The damaged plants dry up completely causing poor crop stand. The important soil insects are white ants (*Odontotermes obsesus*) termites (*Microtermes indicus*), Gujha weevil (*Benymercus indicus*) and cutworms (*Agrotis* spp.). For the control of these insects use 2% Methyl parathion or 5% Malathion dust at the rate of 20-25 kg per hectare and mix it well in the soil at the time of last ploughing before sowing.

### Foliage Pests

Aphids are serious pests in humid regions. They are green to dark coloured small insects. These insects cluster in large numbers and suck the sap from leaves, stem etc. They also spread disease 'barley



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yellow dwarf' transmitting the virus. These insects can be controlled by spraying Oxydemeton methyl (Metasystox) 25 EC or Dimethoate (Rogor) 30 EC at the rate of 1.0 litre in 1000 litres of water per hectare. Repeat the spray at 10-15 days interval.

## **Rodents**

Field rats cause heavy loss to barley crop and do considerable damage to the harvested crops lying in stacks in the field. For rat control fumigate live-burrows with aluminium phosphide at the rate of one tablet of 0.5 g per small burrow, and 3.0 g per large burrow. In case of reappearance in the same field, bait with Cumarin (Ratafin) at the rate of 1 kg of prepared bait (1 part Cumarin: 19 parts wheat or maize flour, 1 part molasses and 1 part mustard oil).



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## **4.14 WATER MANAGEMENT**

- 20-30 cm water.
- Critical stages for irrigation are

**Active Tillering: 30-35 DAS**

**Flag leaf/ booting: 60-65 DAS**

**Milk/ grain filling: 80-85 DAS**



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## 4.15 HARVESTING AND THRESHING

The crop should be harvested immediately after it ripens otherwise it might lodge and shatter grains. This crop shatters more easily than does wheat. It should be harvested in the foreman before the heads become too dry and fragile for handling. Harvesting of crop is done with sickle by manual labour. Threshing is done either by trampling buttocks or by stationary threshers.



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## 4.16 YIELD

When cultivation of high yielding varieties of barley is done with improved scientific methods, they produce about 30-35 quintals of grain and 40-45 quintals of straw per hectare.

The **malting process** converts raw grain into malt. The malt is mainly used for brewing or whiskey/beer making, but can also be used to make malt vinegar or malt extract. Various grains are malted, the most common grains used are barley, sorghum, wheat