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Course name :

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

Course credit :

(2-1-0)

Lecture 17

Topic: Oats



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OATS

SN : Avena Sativa

Family : Poaceae





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1.1 ORIGIN:

Oats is Asiatic origin. Asia minor is believed to be an origin for oats.

Three cultivated types are 7 haploid (14 chromosomes), 14 haploid (28 chromosomes) and

21 haploid (42 chromosomes).

- Common oats (*Avena sativa*) spread in 80% total oat area.
- *Avena brevis* is short oat grown in South Europe for green fodder.
- *Avena abyssinica* is Abyssinian oat grown in North Africa.
- Red oats is grown around Mediterranean region.



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1.2 GEOGRAPHIC DISTRIBUTION

- Oats area and production in the World are about 27m ha and 40m tones, respectively.
- Countries cultivating oats widely are Russian federation, USA, Canada, Poland, China, France and Australia.
- In India, Punjab, Haryana, UP and limited areas in MP, Orissa, Bihar, West Bengal are the Oats growing states.



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1.3 Morphology of plant

1.3.1 Stem:-

- Erect and ascending.
- 40-180 cm in length.
- Soft. • Nodes of stem are swollen and internodes are hollow.
- Stem tufted or clustered.

Oat Stem-inter-node and node

1.3.2 Leaf

- Its leaves are cauline (arise from the upper part of stem).
- The leaves blade are 14-40 cm long.
- Oat has veined rough broad leaf.
- Leaf sheath is smooth and glabrous.
- Short awns and hairy lemmas



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Morphology of plant

The compound **inflorescence** of an **oat** plant, referred to as a panicle is a continuation of the stem, and terminates in a single spikelet. Development of spikelets involves the formation of several florets, of which primary and secondary kernels develop to maturity

grain: caryopsis



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- Oat is primarily cultivated for **fodder and also for grain.**
- Oat rank 6th after cereals crop followed by other cereals.
- The cultivation practices are similar to wheat.
- recently it became very popular due to their health benefits.

Health benefits :

- Source of low calories, high protein and high fibers.
- Help in reducing cholesterol.
- Heart healthy and protect from cancer.
- Regulates blood sugar levels by improving insulin Sensitivity.
- Source of good antioxidants.
- Help in controlling blood pressure.
- Help in weight loss.
- Helps in building strong immune system.



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1.4 ECONOMIC IMPORTANCE •

Oat bran and whole oats are used for high blood pressure;

high cholesterol;diabetes

digestion problems including , inflammatory bowel disease (IBD), diarrhoea, and constipation. They are also used for preventing heart disease, gallstones, colon cancer, and stomach cancer.

- Oats is a good cattle feed, human food in the form of good quality grain, oat meal and cookies.



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1.5 Chemical composition of oat

Chemical constituents	Per-centag Chemical composition of oate at different stages		
	Young	Milk stage	Ripe stage
Crude protein	14.6	6.4	9.2
Fibre	32.8	28.7	34.8
Nitrogen free extract	36.4	53.2	44.7
Ether extract	2.4	2.3	1.8
Total ash	13.9	9.3	9.3
Calcium	0.48	0.47	0.35
Phosphorous	0.33	0.22	0.15
Magnesium	0.22	0.22	0.13
Sodium	0.81	0.52	0.65
Potassium	4.38	2.84	2.43



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1.6 LOCAL NAMES :

➤ Oats, jae, jawie, joi etc.,

Hybrid varieties :

Brunker-10, NP-2, weston -11, NP-1, Algerian, Bundeljai-822, harita, sabzar.

Origin :Asia minor

1.7 Climate :It is a cool season crop. Do not grow well in hot dry conditions.

1.8 SOIL AND CLIMATIC REQUIREMENT Soil • Wide range of soil with good water holding capacity is more suited for oats cultivation. • High N content in soil is not a desirable condition may lead to lodging.

Soil: It grows best on well drained, fertile loamy soils. PH range is 5.5-6.5



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1.9 Climate

- Grows best in cool and moist climate.
- Also, best adapted to cotton belt.
- Cool weather is important during grain filling for high yield.

1.10 VARIETIES:

Kent, Algerian, Bunker 10, Coachmen, HFO 114, UPO 50.

1.11 Cropping system

- Sorghum-oat-maize
- Maize-oat-maize
- Cowpea-oat + mustard-maize + cowpea
- Sorghum + cowpea-oat + lucerne



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1.12 Cultural Methods in Oat Cultivation:

1.12.1 Land preparation: As that of wheat. Seeds and sowing •

- Fanning the light weight seeds is mandatory. Otherwise, even if those germinate, results weak stem and poor yield.
- About 25-30% seeds are normally rejected.

1.12.2 Seed rate recommended is 100 kg/ha.

- Best time of sowing for oats is mid October to mid November.
- 15th October is optimum time for fodder production.
- Method of sowing: Drill sowing is better than broadcasting.

1.12.3 Spacing: 20-23cm row spacing for fodder and 23-25cm for grain production is optimum



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. 1.13 Manures and fertilizer

12.5 t/ha of FYM is to be applied before last ploughing and to be incorporated before sowing.

80:40:0 kg NPK/ha is the recommended dose of fertilizers.

100% P is to be applied as basal.

60kg N is to be applied as basal, 10kg at first irrigation and 10kg at second irrigation is good for higher yield.

10 kg of N is to be applied after first cutting if sown for fodder cum grain.



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1.14 Water management

- Oats requires higher water than wheat.
- 4-5 irrigations provide good yields. Generally, irrigation immediately after each cutting is mandatory.
- Critical stage for irrigation of oats is tillering stage.

1.15 Weed management

One hand weeding is sufficient in grain

No fodder no weeding required



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1.16 Disease

Anthracnose *Colletotrichum graminicola*

Symptoms

Red to brown oval lesions on the leaves; black fungal structures may visible on lesions; crowns become bleached and then turn brown; plants are more susceptible to lodging

Management

Provide plants with adequate levels of fertilizer; rotate crops to improve soil quality; control weeds in field; turn crop debris into soil after harvest to limit release of spores; avoid planting oats in soils with a high pH`



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Crown rust *Puccinia coronata*

Symptoms

Chlorotic flecks or brown necrotic spots on leaves or stems; yellow streaks or patches on foliage; brown necrotic streaks on foliage; raised orange pustules may be present on lesions

Management

The most effective method of controlling rusts is to plant resistant varieties of oats; planting oats early allows them to mature before spores reach plants and escape most damage



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Loose smut *Ustilago avenae*

Symptoms *Loose smut symptoms*

Early emergence of heads; dark green or black masses in place of kernels

Management: Use only certified smut-free seed; treat seeds with hot water prior to planting to kill fungi; treat seeds with systemic fungicide (fungi inside seed) fungicide; grow resistant varieties

Powdery mildew *Erysiphe graminis*

Symptoms

Patches of cottony, white-gray growth on upper surface of leaves which turn gray-brown; chlorotic patches develop on leaves opposite fungal growth; fungal fruiting bodies usually become visible as black dots on the mildew

Management: Planting resistant varieties is one of the best ways to protect plants from powdery mildew; other control strategies include: application of appropriate foliar fungicides, if available; removal of crop debris from field after harvest to reduce the level of overwintering fungus; removal of volunteer oat plants which can act as a reservoir for the disease



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1.17 Insects

Aphids (Bird cherry-oat aphid, Russian wheat aphid, Corn leaf aphid, etc.) *Rhopalosiphum padi*

Symptoms

Yellow or white streaked leaves; flag leaves may be curled up; plants may be stunted and tillers may lie parallel to the ground; plants may turn a purple color in cold weather; insects are small and soft-bodied and may be yellow, green, black or pink in color depending on species; insects secrete a sugary substance called "honeydew" which promotes the growth of sooty mold on the plants

Management

Sturdy plants can be sprayed with a strong jet of water to knock aphids from leaves; insecticides are generally only required to treat aphids if the infestation is very high - plants generally tolerate low and medium level infestation; insecticidal soaps or oils such as neem or canola oil are usually the best method of control; always check the labels of the products for specific usage guidelines prior to use; in commercial plantations aphid numbers are usually kept in check by predators and natural enemies; beneficial insect populations should be assessed before chemical control is considered; if no beneficial insect populations are present and aphids are damaging then apply appropriate insecticides



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Armyworms *Mythimna unipunctata* *Spodoptera praefica*

Symptoms

Entire leaves consumed; notches eaten in leaves; egg clusters of 50-150 eggs may be present on the leaves; egg clusters are covered in a whitish scale which gives the cluster a cottony or fuzzy appearance; young larvae are pale green to yellow in colour while older larvae are generally darker green with a dark and light line running along the side of their body and a pink or yellow underside

Management

Organic methods of controlling armyworms include biological control by natural enemies which parasitize the larvae and the application of *Bacillus thuringiensis*; there are chemicals available for commercial control but many that are available for the home garden do not provide adequate control of the larvae



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1.18 Harvesting in Oat Cultivation

1. The oat crop mature within 120 days after sowing.
2. For fodder purpose two cuttings are taken at 50-60 day interval.
3. Then oat is left for seed setting.
4. Harvesting for grain is done in early April before plant is dead ripe to avoid shedding of grain.



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Yield in Oat Cultivation

1. When grown only for grain purpose 16 to 20 qt grain and 25 to 30 qt straw/ha.
2. 2. When grown as fodder the yield is about 200-300 qt fodder and 4 to 5 qts of grain/ha.



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