Maize (*Zea mays* L.)

A) Crop Botany:

It belongs to family Poaceae.

i) Root: Its root system consists of 3-5 seminal roots, secondary roots that develop from node just under the soil surface and aerial (brace) roots that develop from the nodes above the ground.

ii) Stem or stalk: It is thick and strong which bears leaf at each node.

iii) Leaves: Each leaf consists of a leaf sheath which covers the stem and a broad leaf blade.

iv) Inflorescence: It is of two types i.e. male inflorescence called tassel and female inflorescence called ear. Both types of inflorescence are produced on the same plant. Tassel is produced at the top of plant and is a branched panicle with only male spikelets, each of which contains two florets with three anthers in each.

Ear is developed in the middle of stalk on a short lateral branch called shank. It is a spike whose thick axis (Cob) carries 8-30 rows of paired spikelets. Each spikelet contains two florets, of which usually one in fertile. Each floret has a single ovary, terminated by a long style or silk that is covered with fine sticky hair to which pollen grains adhere. The ear is covered and protected by husks that are modified leaf sheaths. Maize is a cross-pollinated crop.

v) Seed: The grains or kernels are produced that are held very tightly on the cob.

B) Agro-meteorology:

i) Climate: It is a summer crop that can be grown in tropical and sub-tropical regions with high temperature and enough sunshine. It is adapted to variable rainfall and can be grown at rainfall of 25 cm up to 500 cm. The optimum rainfall requirement for this crop is 75-125 cm / annum. It can be successfully grown from sea level up to 4000 m altitude.

ii) Soil: The soil having good drainage and water holding capacity is suitable. Medium to heavy loam deep soils with high organic matter content are suitable for this crop. Soil pH should be 7-8 and waterlogged sandy or saline soils are not suitable for it.

C) Economic Importance:

It is third most important food crop after wheat and rice. It is major staple food in many countries of the Latin America and Africa. About 2/3rd of total world production is used for livestock feed and for commercial starch and oil production.

Industrial products of maize are starch (it is used in textile industry and production of corn syrup), sugar syrups, glucose, Energile, alcohol, dextrin (it is used in leather industry), jellies and custards, corn flakes etc. Poultry and livestock feed is made from grain. Silage and hay is prepared for milch animals. Its grain contains 3-4% oil that is considered of good quality as it contains linoleic acid. Area of Pakistan under maize crop in 2018-19 was 1.32 million ha, and production was 6.31 million tonnes with average yield 4.79 tonnes / ha.

D) Production Technology:

1) Seed bed preparation: 1-2 deep ploughings, 3-4 cultivations followed by 2-3 plankings are sufficient to prepare good seed bed.

2) Sowing time: There are two growing seasons:

a) Spring maize: End January – 15th March. It matures in June.

b) Autumn maize: 1st week of July – End August. It matures in November.

c) Barani areas: 15th March – 15th April

Two types of maize are grown:

a) Hybrids: FH-810, Yousafwala hybrid, FH-949, FH-1046, YH-1898, Monsanto, ICI and Pioneer hybrids with various names are also popular among growers.

b) Synthetics: Sahiwal-220, Agaiti-2002, Pearl, MMRI-yellow, Malka-2016

3) Seed rate: 8-10 kg / acre for ridge sowing

12-15 kg / acre for flat sowing by single row cotton drill

4) Sowing method: Two methods are used for maize sowing:

a) Flat sowing: Row to Row distance = 60-75 cm

P to P distance = 25-30 cm

It can be sown by dibbler or single row cotton drill in barani areas. Dibbler maintains P to P distance but single row cotton drill sown crop needs to be thinned for maintaining P to P distance.

b) Ridge sowing: Ridge to Ridge distance = 60-75 cm

Plant to Plant distance = 25-30 cm

After irrigation application in ridges, manual sowing is carried out by *chopa* method or dibbler just above the water line on one side but not on top of ridge. Ridge sowing is usually practiced in the irrigated areas.

In spring sowing, ridges are made in east-west direction and seed is sown on south side of ridge because seed requires sun light from south. East-west ridges increase water use efficiency.

In kharif sowing, ridges are made in north-south direction to facilitate the light penetration into the crop rows.

5) Fertilizer:

Maize type	**N**	**P_2O_5**	**K_2O (kg/acre)**

Hybrids	110	46	25
Synthetics	95	35	25
Barani areas	34-46	23-34	12-25

Whole of P and K at sowing but N in 3 splits as:

1/3 N at sowing

1/3 N at knee height

1/3 N at earing

6) Irrigation:

Spring crop = 10-12 irrigations

Autumn crop = 8-10 irrigations

Critical stages for irrigation are tasseling, silking, fertilization, milking and dough stages.

E) Plant protection measures:

i) Weeds: up to 30% reduction in yield occurs due to weeds. All summer season weeds are present in maize especially itsit, tandla, and deela. Weeds must be controlled within 15-45 DAS.

Herbicides:

a) Grassy weeds: Pendimethalin @ 2 L / acre with 1st irrigation

Atrazine + S-metaolachlor @ 800 ml /acre with 1st irrigation

b) Sedges: Halosulfuron methyl @ 20 g / acre as post-emergence spray at 2-3 leaf stage of weeds

c) Broadleaf weeds: Pendimethalin @ 2 L / acre with 1st irrigation

atrazine @ 330 ml / acre at 2-3 leaf weed stage

ii) Insect-pests: Maize stem borer, shoot fly, aphid, whitefly and thrips

Furadan or Padan @ 9 kg /acre. The 2-3 granules of insecticides in uppermost leaf whorl during early growth stages of crop

7) Harvesting and Threshing: Cobs are picked up manually or whole plant is cut from the base.

Maize shellers are used to separate grains from cob.