
بسم الله الرحمن الرحيم

MAIZE PRODUCTION TECHNOLOGY

Climate

- Temp. Sensitivity Range <10°C and>40°C
- Minimum Temp. for Germination = 10°C - 12°C
- Germination optimum at 16°C - 18°C
- Zero tolerance to frost at any growth stage
- Dangerous humidity range for pollination <20% and>80%
- Optimum Temp. for growth 21°C -32 °C
- Optimum Relative humidity 30% - 50%

Soil

- Loam to heavy loam
- pH 7.0-7.5
- Having sufficient organic matter
- Having good water holding capacity
- Sufficient organic matter
- Avoid on poorly drained or sandy soil
- Salt affected soils
- Availability of sufficient irrigation water
- Deep soils

SOWING TIME

Depends on climatic zone and weather forecast.

Spring

- **20th January to End February**

Autumn

- **1st week of July to 15th August**
- **In southern Punjab maize may be sown after 20th July**
- **Early maturing varieties can be sown up to 20th August**

FERTILIZER REQUIREMENTS OF MAIZE

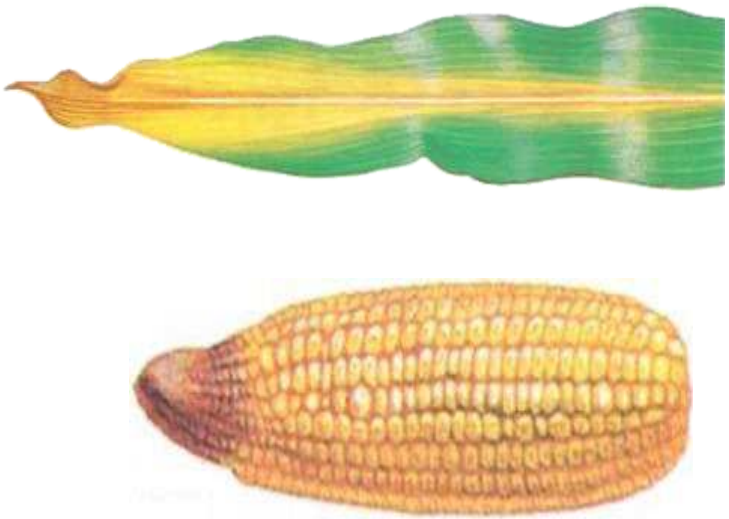
DAP=2.5 BAGS

UREA =3 BAGS

SOP=1.5 BAGS

Deficiency Symptoms

Nitrogen



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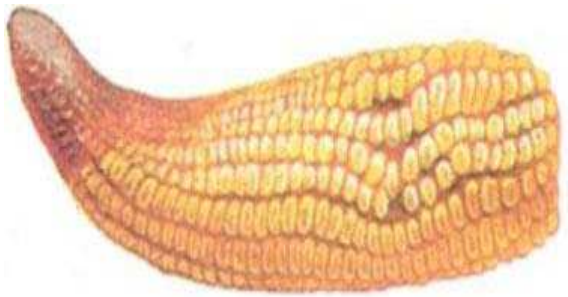
Phosphorus



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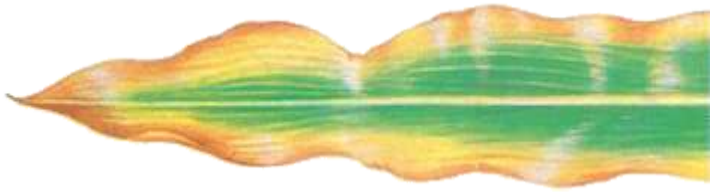
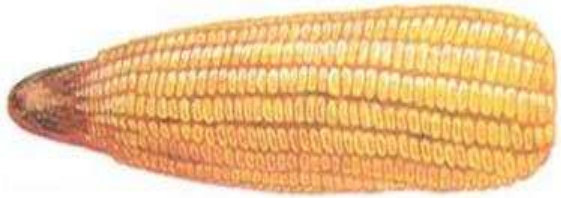
Potassium



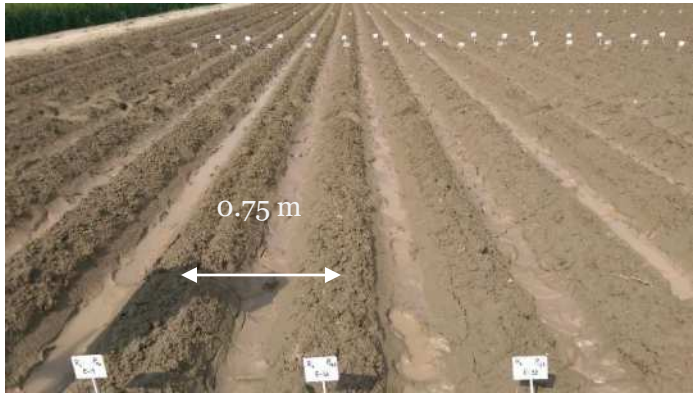


Corn Planting Geometry

Distance between rows (m): 0.75

East –West ridges in spring planting

Sowing on south side of ridges in spring



Distance between plants (m): 0.15 – 0.20

Sowing Direction

- In spring season sowing is done under low temperature
- Seeds take more time to germinate and remains in the soil for longer time which increases the likeliness of seed decay due to insect or disease
- Ridges should be made east to west
- Sowing should be done on southern side of the ridge where more sunshin will accelerate germination process.
- It can increase yield 5-10%.

MAIZE OPV'S DEVEPLOPED

Sr. No.	Name	Year	Potential Yield (Kg/ha)	Avg. Yield (Kg/ha)
1.	Neelum	1970	6,775	6,175
2.	Agaiti-72	1972	4,888	4,261
3.	Akbar	1973	7,000	6,022
4.	Sadaf	1975	6,800	5,787
5.	Sultan	1986	7,454	6,172
6.	Golden	1994	7,800	6,286
7.	Agaiti-85	1994	5,498	4,940
8.	Sahiwal-2002	2002	7,175	6,360
9.	Agaiti -2002	2002	5,884	5,496
10.	MMRI-Yellow	2011	8,500	6,600
11.	Pearl	2011	7,500	6,000
12.	Malka-2016	2016	8,800	7,200
13	**Gohar-19**	**2019**	**8960**	**7500**
14	**Sahiwal Gold**	**2019**	**9100**	**7800**
15	**CIMMYT Pak**	**2019**	**7158**	**6000**
16	**Pop-1**	**2019**	**5500**	**4200**
17	**Sweet-1**	**2019**	**4420**	**3500**

SEED RATE AND SEED TREATMENT

SEED RATE

8 - 10 kg per Acre

SEED TREATMENT

a) Insecticide

e.g. Imidachloprid 70WS @ 7 gm/Kg seed

b) Fungicide

e.g. Topsin-M 70 WP @ 2 gm/Kg seed

Planting Density

For ridge sowing

a) Spring season:

Hybrid (6 inches) = 35000 plants/ acre

OPVs (7-8 inches)= 26000 to 30000 plants acre

b) Autumn season:

Hybrid (7 inches) = 30000 plants/acre

OPVs (8-9 inches)= 23000 to 26000 plants/acre

Weeds

1. **Broad leaf weeds**

   It sit, Bathu, Krund, Tandla, Lehli, Bakhra, Kulfa, Jangli Palik, Jangli haloon, Chibber, Dodhak, Chulai etc.

2. **Narrow Leaf weeds**

   Grasses Swanki, Madhana, Khabbal , Baru etc.

3. **Sedges**

   Deela

   1. *Cyperus rotundus*
   2. *Cyperus irria*
   3. *Cyperus deformis*

Trianthema portulacastrum (It sit)

Chenopodium murale (Krund)

Echinochloa colona (Swanki grass)

Digera arvensis (Tandla)

Tribulus terrestris (Bakhra)

Portulaca oleracea (Qulfa)

Rumex obtusifolius (Jangli palak)

Euphorbia prostrata (Dodhak)

Amaranthus viridis (Jangli cholai)

Cynodon dactylon (Khabbal grass)

Cyperus rotundus (Deela)

Coronopus didymus (Jangli halon)

Convolvulus arvensis (Lehli)

Control

Narrow leaves

1.Pendimethalin 2 L/acre

2.S.Matalaclor + Atrazine 800ml/acre

3. Halo sulforan 20g/acre (dela)

Broad leaves

1.Pendimethalin 2 L/acre

2. Atrazine 330ml/acre

INSECT PESTS OF MAIZE & THIER CONTROL

IMPORTANT INSECTS/PESTS OF MAIZE

- Maize Stem Borer
- Shoot Fly
- Army Worm
- American Worm
- Aphid
- Jassid
- Mites
- Termites

MAIZE STEM BORER

- Major loss occurs due to maize borer in Kharif Maize i.e. about 1/4th of the crop
- In sever attack, total crop destroys
- Attack appears at 4” height of the crop
- Larvae enter in the stem and cut off the shoot/whirl, resultantly the shoot dries
- In many cases larvae attack on tassels as well as on cobs
- In spring maize, it attacks at the end of March to start of April

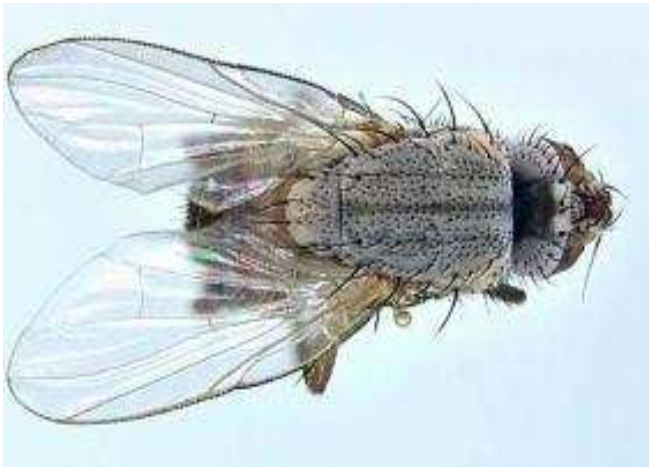
MAIZE STEM BORER

CONTROL

- Carbofuran (Furadon 3G, Sun Furan 3G etc.)@ 4-6 kg/acre at 4-6 leaves stage. 4-5 grains per whirl and irrigate the crop soon after granule application

SHOOT FLY

- Mostly attacks in Spring Maize
- It attacks on the crop from germination to one month later
- It appears in the last week of February and attacks upto April
- Female lays eggs on leaves of tiny plants separately
- Larvae come out from the eggs within 2-3 days
- They pierce the leaves and reach in the central parts of leaves and suck the juice until the whirl comes dry, growth stunts and resultantly low yield.



SHOOT FLY

CONTROL

- Confidor 70 WS (Imidacloprid) 7 gm/kg seed treatment save the crop from shoot fly's attack in preliminary 40 days
- Confidor 200 SL (Imidacloprid) @ 200ml/acre or Arrivo 10 EC @ 250ml/acre
- Repeat the same after 8-10 days

ARMY WORM

- Actually this is the insect of Tobacco and Cotton, but it also attacks on maize
- Its larva attacks on the crop in large quantity
- They eat the leaves of plants just like sheep
- In severe attack these larvae eat all the leaves and only the stem left behind
- It also cuts the silks of the cobs and in this way the yield decreases ultimately

ARMY WORM

CONTROL

- Spray of Bestox 5EC, Timer 1.9EC @ 200-250ml per acre in 120 liters of water

AMERICAN WORM

- This worm at initial stage is of white color, and it turns into green color later on, this insect eats the tiny leaves of the plant
- Later on it cuts the silks of the cobs and enters in the cobs
- After entering, it eats the grains of the cobs which results in low yield

AMERICAN WORM

CONTROL

- Spray of Bestox 5EC, Timer 1.9EC @ 200-250ml per acre in 120 liters of water

APHID

- It attacks before the cob formation and sucks the juice of the plants
- It oftenly attacks on upper leaves (Leaf Boot) and male flower (Tassel)
- In severe attack the pollination is stunted and yield decreases

APHID

CONTROL

- Spray of Advantage 20EC, Azodrin 40WSC etc. @ 500ml/acre

JASSID

- It attacks on Spring Maize soon after the attack of shoot fly
- It sucks the juice of the plants, resultantly white spots appears on the leaves, and leaves start to dry slowly
- In severe attack all the leaves dry, except some upper leaves which reduce yield

JASSID

CONTROL

- Spray of Advantage 20EC, Azodrin 40WSC etc. @ 500ml/acre

MITES

- It attacks mostly on Spring Maize
- It sucks the juice from the leaves & in severe attack plants dry

CONTROL

Pyrida or Current 15EC @ 400-500ml/acre spray

TERMITES

It attacks on the roots and plant becomes dry & lodging occur which adversely affect the yield

CONTROL

Chloropyriphos 40 EC @ 1.5-2.0 liter/acre or Imidacloprid 200 SL @ 250 ml/acre with irrigation at the time of sowing or attack

DISEASES OF MAIZE & THEIR CONTROL

SEED AND SEEDLING DISEASES

- Sick seed does not grow properly
- If the some seeds grow, the plants wilt and necrosis of plant occur
- Wilting of newly grown plants occur mostly in the early growing crops due to high temperature
- Fusarium, Pythium, Nigrospora, Diplodia etc. fungi cause seed and seedling disease

SEED AND SEEDLING DISEASES

SEED AND SEEDLING DISEASES

CONTROL

- Use of healthy seed
- Use of resistant varieties/hybrids
- Seed treatment with Topsin-M @ 2 gm/Kg of seed

LEAF BLIGHT

Northern Leaf Blight

C:O *Helminthosporium turcicum*

- It is mostly found in cold & hilly areas
- The disease appears first on lower leaves & then spread on all the leaves of plant
- Elongated & spindle-shaped necrotic lesions appear on leaves
- In severe attack, leaves become dry due to which plants can't synthesize food & production is reduced.

LEAF BLIGHT

CONTROL

- ✓ Destroy the plant disease debris of previous crop
- ✓ Spray the fungicide Dithane M-45 @ 500 gm/acre or Benlate @ 500 gm/acre or Antracol @ 2 gm/liter of water at the appearance of disease
- ✓ Repeat the spry after 10 days

RUST OF MAIZE

C:O *Puccinia sorghi*

- *This disease attacks on maize crop in spring season*
- *High temperature and high humidity favour the disease*
- *Leaves loose their green color, dry up and drop on the ground*
- *In severe cases, plants do not bear the cobs*

RUST OF MAIZE

- *Yellow spots appear on leaves which turn into reddish brown in colour and then become postules.*
- *The postules burst soon, dislodging the reddish brown powdery mass*

CONTROL

✓ Use resistant varieties

SMUT OF MAIZE

C:O *Ustilago maydos*

- *This disease is mostly found in hilly areas & appears in the form of small tumors/galls on any part of the plant above the ground*
- *First gall is seen on leaves when plant is more than a foot high*
- *On the appearance of tassels, small galls appear on it*

SMUT OF MAIZE

CONTROL

- Crop rotation
- Field Sanitation
- Use of resistant varieties
- Seed Treatment
- Destroy the plant disease debris of affected crop
- Do not grow the crop in the affected fields for some years

EAR ROT

a. Gibberella Ear Rot

C:O *Gibbearella zeae*

- This pathogen is most common in cool and humid areas
- White mycelium moves down from the tip of cob which later turns reddish pink
- This fungus produces Mycotoxins (Deoxynivalenol, Zearalenone & zearalenol) which are harmful to animals

EAR ROT

b. Fusarium Ear Rot

C:O *Fusarium moniliform*

- It is most common pathogen of maize ears throughout the world
- Infected kernels develop a cottony growth or may develop white streaks on pericarp and germinate on the cob
- Fungus produces mycotoxin (Fumonisins) which are harmful to several animals

EAR ROT

CONTROL

Maize varieties of weak stalks should not be grown

Use of resistant varieties/hybrids

Fertility of soil should be maintained by putting proper amount of fertilizers

After harvesting of the crop remaining parts of plants should be destroyed

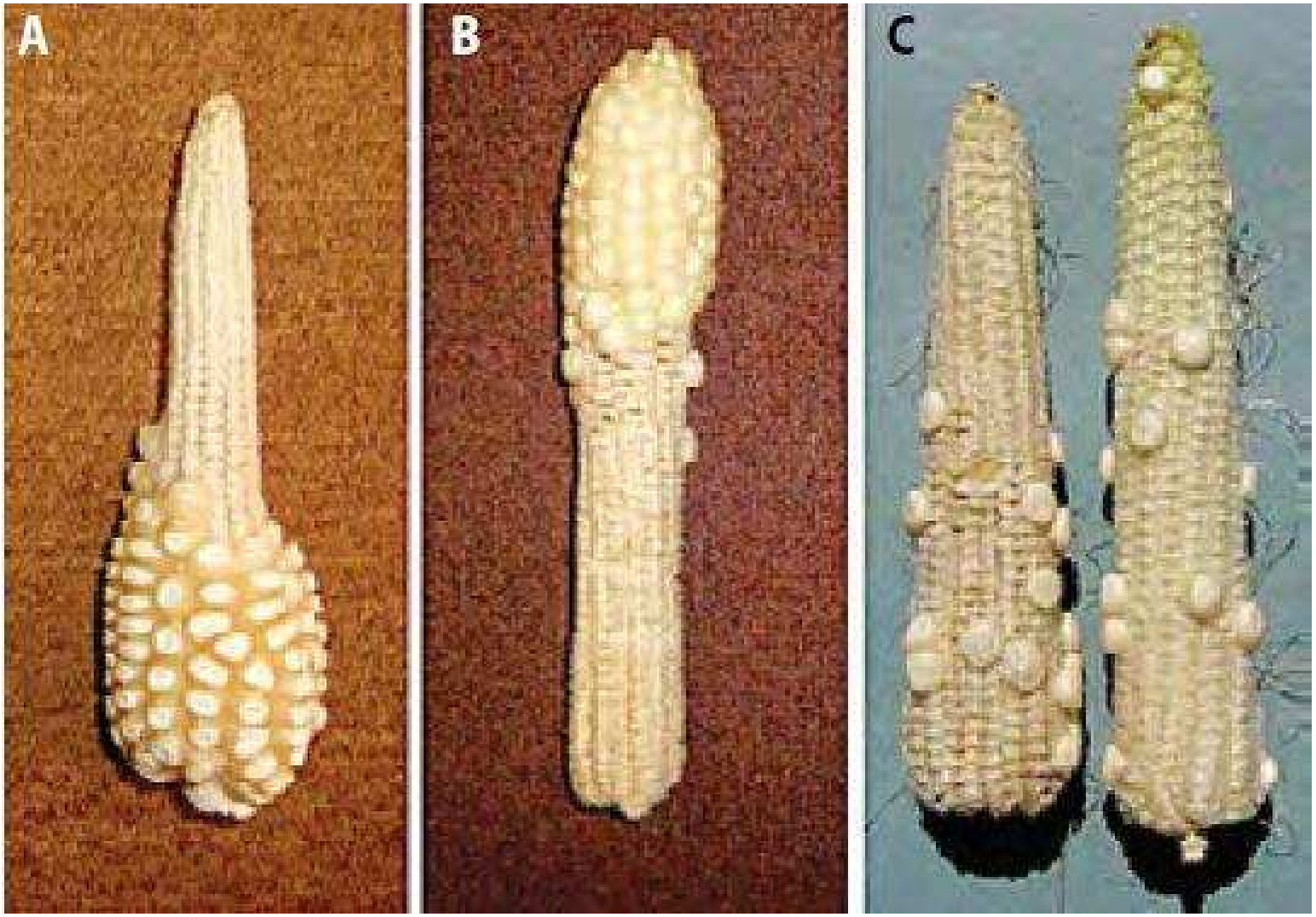
If the cobs should properly dry up after harvesting, then damage due to this disease can be avoided

Moisture % age should not be more than 12% when cobs are stored in gowdams

Issue of pollination failure

- No fertilization and no seed development
- Why it happens??
  - Lack of synchronization
    - Genetically controlled
    - Drought stress + heat stress
  - Pollen desiccation
  - Silk receptivity problem
  - Silk clipping
- Water availability is very important at this stage

How it look likes??



A: Late in season

B: Early in season

C: Pollen viability or Silk Receptivity issues


THANK YOU