



Problematics of Maize Cultivation in Dadri Block of Gautam Buddh Nagar.

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INTRODUCTION.

Botanical name = Zea mays
 Family = poacea
 Chromosome no. = $2n = 20$
 Plant type = C4 and long day plant
 Inflorescence = tassel and ear / cobe
 Fruit type = caryopsis

GENERAL INFORMATION.

1. Maize is a non- tillers cereal crop
2. DMR = Directorate of maize research (New Delhi)
3. Maize is back bone of America
4. Under All India Co-ordinate maize improvement project Ganga 101, Ranjeet, Dikaris release in 1961
5. Yellow color of maize is due to presence of Cryptoxanthin
6. All India Co-ordinated maize improvement project was started in 1957. first time in 4 years four double hybrid was discovered Ganaga-1, Ganaga-101, Decan, Ranjeet
7. The difference between corn and maize is Corn is mainly used in North America, however in the UK and other parts of the world, maize is more commonly used.

IMPORTANCE OF MAIZE

1. Maize is having a high amount of phosphorus
2. It can be used as green fodder specially it has zero HCN content
3. Maize is a Important crop for world agriculture economy 85% consumed as human food
4. Grain alcohol from maize is traditionally the source of Bourbon whiskey.
5. Maize is increasingly used as a feedstock for the production of ethanol fuel like corn ethanol and corn strove
6. Starch from maize can also be made into plastics, fabrics, adhesives, and many other chemical products.
7. Chrysanthemum is found in purple corn and is used as a food coloring.
8. Maize is widely used in Germany as a feedstock for biogas plants.
9. Maize is used as a fish bait, called "dough balls". It is particularly popular in Europe for coarse fishing.

10. Nutritional Value of Maize per 100 g.

- Energy =360 kJ (86 kcal)
- Carbohydrates=18.7 g
- Starch=5.7 g
- Sugars =6.26 g
- Dietary fiber=2 g
- Fat=1.35 g
- Protein=3.27 g
- {Vitamins Quantity%DV†}
- Vitamin A equivlutein zeaxanthin=1%9 µg
644 µg
- Vitamin B6=7%0.093 mg [Folate (B9)
11%42 µg]
- Vitamin C=8%6.8 mg [Minerals Quantity%DV†]
- Iron=4%0.52 mg
- Magnesium=10%37 mg
- Manganese=8%0.163 mg
- Phosphorus=13%89 mg
- Potassium=6%270 mg
- Zinc=5%0.46 mg
- {Other constituents}
- Quantity Water =75.96 g

Source: USDA Food Data Central

Classification of Maize (reff. Sturterant ,1899)

- 1.Zea mays Indurate (flint corn) most cultivated in india
- 2.Zea mays Indentata (dent corn) about 95% of production in USA is dent corn
- 3.Zea mays saccharate (sweet corn) sweets among all
- 4.Zea mays amylase (flour corn) kernel is large composed of soft starch
- 5.Zea mays everta (popcorn) it is Kernal is small and extreme form of flint corn when heated to 270°C the grain suieil and burst and turning inside out before 3 - 4 days silking stage at harvesting
- 6.Zea mays ceratina (waxy corn) due to waxy appearance of the kernel it is called as waxy corn
- 7.Zea mays zunicata (pod corn) husked primitive type

Area and Distribution

- In India 83% of the Maize is grown in summer spring and in kharif season
- Remaining 17% grown in Rabi season
- In the world USA

: Maize production in different states across in India

- Andhra Pradesh (20.9 %)
- Karnataka (16.5 %)
- Rajasthan (9.9 %),
- Maharashtra (9.1 %)
- Bihar (8.9 %)
- Uttar Pradesh (6.1 %)
- Madhya Pradesh (5.7 %)
- Himachal Pradesh (4.4 %).

Climate require and Rainfall

Mainly mustard is kharif season crop but it can be grown in any kind of season by the cause of some genetic engineering and plant breeding techniques

Maize cannot tolerate frost and hence it is a Kharif crop sown just before the monsoons arrive in India. It requires about 70 mm of rainfall. Alternate spells of sunshine and rainfall is optimal for maize production.

Temperature required for maize crop

Minimum temperature= 8-10°C
 Optimum temperature= 30-35°C
 Maximum temperature= 40-44°C

1. Mainly maize is a kharif season crop growing in Northern India
 2. Maize is warm weather plant
 3. Maize required considerable moisture and warmth for Germination to Flowering
 4. It can tolerate temperature up to 35°C.
- Soil requirement

- The Maize is very sensitive to water lodging condition so for its cultivation a well labelled land required
- Maize required deep - medium textured well drained fertile soil with the pH ranging of 5.5 to 8
- The best soil consider for cultivation is Loamy sand to sandy loam

Seed required and Sowing method

Maize is sown in rows, 60-75 cm apart, whereas the plants in the row are spaced at 20 to 25 cm. A population of 60-75 thousand plants per hectare at harvest are required for obtaining the optimum yield. Sowing in rows is generally done with drill or by dropping the seed behind the plough.

•Requirement of seeds in different climate in India.

Purpose, seed size, season, plant type, sowing method these factors affect seed rate.

- 1) For winter and spring maize: use seed rate of 8-10 kg/acre.
- 2) Sweet corn: Use seed rate of 8 kg/acre.
- 3) Baby corn: 16 kg/acre seed rate.
- 4) Popcorn: 7 kg/acre seed rate.
- 5) Fodder: 20 kg/acre seed rate.

For seed treatment.

To protect seeds from downy mildew, treat the seed with Carbendazim or Thiram@2 gm/kg of seeds. After chemical treatment, treat seed with Azospirillum@600 gm+ rice gruel.

Fungicide name Quantity (Dosage per Kg seed)
 Imidacloprid 70WS 5 ml
 Captan 2.5 gm
 Carbendazim + Captan (1:1) 2 gm

•Fertilizers requirement and Application for maize cultivation

Maize is that type of plant which takes lots of nutrients for the maize plant there are two types of fertilizer are there

1. Organic fertilizer
 Ex. Cow dung, Chicken dropping and compost
2. Mineral fertilizer
 Ex. NPK, Sulphate of Amonia and Urea

Application of fertilizer and amount of fertilizer.

Organic fertilizer

- 2 tonnes for organic manure is enough for 1 Acre soil before planting.
- Organic fertilizer improves the soil structure and tilth of the soil.
- The Organic manure should be mixed in soil before planting

Mineral fertilizer

- Amount of fertilizer and name of fertilizer for per Acre .
 Urea =1/2 bag
 Sulphate of Amonia = 1bag

N.P.K = bags

Time of fertilizer.

1st dose

After 2 or less than 2 weeks of planting when plant get 2 to 3 floral leaves

2nd dose

After weeks of plant when the plant has 8 10 floral leaves

•Some Important points about fertilizer application.

- 1.After tussling the fertilizer we give to plant is couldn't be used properly
- 2.Applied at time
- 3.Use Right type of fertilizers
- 4.Right amount of Fertilizers
5. The application of fertilizer should always be done in moist soil.

•Weed management

Weeding is very important for Maize cultivation the weed can affect the yield of crop although can become host for pest and disease

Types of weeds appears on our maize field.

1.Seasonal weeds

2.prennual weeds

- Removing of seasonal weed a is easy because they are shallow rooted and can be easily removed by Hoe although If we will not remove them, they will disappear after the season is over
 - Perennial weed they are hardly to remove because of the three deep rooted system
- For removing them we have to use some weed removing exercise.

°Hoeing

°Bullock

°Hand weeding

°Use of Chemicals Herbicides

Some chemical herbicide which are used in weed field are.

*Atrazine 80%WP Apply 1-3 days after planting of maize at the rate of 4 to 5 liters /hac

Following tips for weeding in field

1. Weeding at time (1st weeding at 2-3 weeks after germination) and when there is need the weeding should be done till 10 weeks after germination
2. Removal of weeds before they produce seeds
- 3.Do not apply high concentration of Herbicide
- 4.After 10 weeks weeding can be stopped
- 5.We can control weeds by IWM Method

•Physiological disorders for Maize plants

The physical disorders occurrence happens due to deficiency of several elements which helps to grow plant at stage to stage as well all know that there are 17 essential elements which helps in plants development and we will take a look what happen when some of them deficiency occurs

: **Nitrogen** = As we all know that Nitrogen is major essential element in plant growth and by the deficiency of Nitrogen the plant turns pale green in (V) shape yellow coloration on leaves starts from leaf end to leaf collar

: **Phosphorus** = Phosphorus work as root growing hormone and after germination and in fully developed plant when Phosphorus deficiency occurs plant turns out dark green and lower leaves show reddish -purple discoloration

: **Potassium** = potassium work as immunity booster and translocator of nutrients in the plant while when its deficiency occurs leaf margins turn yellow and brown. Which appears like firing or drying the symptoms starts from lower leaf to upper leaf

: **Sulfur** = symptoms occur on lower and younger leaves where we will see yellow stripping know as Interval Chlorosis

: **Zinc** = Upper leaves shows broad band of yellow coloration and later trim pale brown grey necrosis. the symptoms first appearance in the middle of leaves and outwards of leaves.

•Disease and their management in maize

There are several types of disease which occurs in the maize crop although they are differences between there type of infection and causal organism some, we have diffracted them into several category like Fungal disease, Bacterial Disease, Viral Disease

So first we will gonna talk about fungal disease that are written below.

1.Anthrocnose.

Category: fungal.

Causal organism: Anthrocnose colletotrichum graminicola

Symptoms.

- Small oval or elongated water-soaked spots which enlarge up to 15mm long appears on leaves.
- spots develops a tan Centre and red brown or orange border
- severely infected leaves or susceptible hybrids may wither and die
- Fungal fruiting bodies develop on dead tissues and may produce pink or orange spore masses

Infection time.

Fungus survives the winter on crop debris. Emergence of disease is favored by high temperature and extended periods of wet and cloudy weather seedlings and mature plant are most susceptible to the disease.

Management.

Plant hybrids resistance to Anthrocnose. crop rotation and ploughing crop debris into soil may help reduce incident for early season infestation.

Some resistance varieties.

LB1, LB6, ECB8, LO4-2, Pa91, T111 and LB-58

2. Common rust

Category: Fungal

Causal organism: puccinia sorghi

Symptoms.

Oval or elongated cinnamon brown pustules on upper and lower surface of leaves pustules rupture and release powdery red spores pustules turn dark brown black as they mature and release dark brown prordery spores in infection is severe pustules may appears on tassels and ear and leaves may begin in yellow in partially resistance corn hybrids symptoms appear as chlorotic or necrotic flecks on the leaves which release little or no space

Infestation.

Disease is spread by wind - borne spores some of the most popularly grown sweet corn varieties have little or no resistance to the disease

Management.

The most effective method of controlling the disease is to plant resistance hybrids application fungicide may provide some degree on control and reduce decrease severity fungicide is still low generally when plants only have a few rust pustules per leaf

3. Charcoal rot

Category: Fungal

Causal organism: Macrophomina phaeolina

Symptoms: Usually first appearance at the tasseling stage plant stalk become shredded and pith is completely rotted with string of vascular tissues left intact small black fungal fruiting bodies are visible and the tissues are grey coloration.

Infestation.

Emergence of the disease favored by worm soil with a low moisture content fungus overwinters in the soil and can also survive on other host plants which include sorghum and soybean

Management.

There is currently no available fungicide to treat the disease avoid stressing plants by practicing good water management, crop rotation, small grain may help reduce disease incidence

Some resistance varieties = FH - 1228, FH- 1025 and FH- 1225

4. Cerospra leaf spot (Grey leaf spot)

Category: Fungal

Causal organism: Cercospora zeaemaydis

Symptoms:

- Brown spots with yellow rings throughout the leaf during the growing period of plant
- brown spots that are 0.15-0.2 cm in diameter
- In serious case can lead holes throughout the leaves

Infestation:

- Emergence is favored in areas where a corn crop is followed by more corn with no rotation.
- Prolonged periods of foggy or cloudy can cause Cercospora epidermis

Management:

Plants corn hybrids with resistance to the disease crop rotation and ploughing debris into soil may reduce levels of inoculum in the soil but may not provide control in areas where the disease is prevalent foliar fungicide may be economically viable some high yielding susceptible hybrids.

4. Downy mildew disease

Category: Fungal

Causal organism: Peronosclerospora sorghi

Symptoms:

The disease appears as early from two weeks after sowing resulting in Chlorosis and stunting in older plants the leaves show according chlorotic streaking and lesions and white strip leaves usually the leaves are narrow and move erect when compared to healthy plants

Infestation:

The disease in both air and seed born the pathogen have several Alternative hosts

Management.

Grow available resistance varieties and hybrids follow crop rotation with non-host crops use suitable systemic fungicide for both seed treatment and foliar spray. keep the fields free from weed drying seed before sowing reduce the disease incidence.

5. Bacterial leaf blight

Category: Bacterium

Causal organism: pseudomonas rubrilneas

Symptoms:

Water-soaked linear spots on leaves as they emerge; spots turn brown and may subsequently turn gray or white; spots may have a red border; after the leaves are mature, spots do not tend to extend any further; no new lesions tend to appear after tasseling; if corn variety is susceptible, mature leaves may shred after maturity.

Infestation:

Bacteria can also cause disease in oats, barley, wheat, some millets and sorghum.

Management:

Resistant hybrids should be planted in areas where the disease is prevalent; plowing crop debris into soil and rotating crop may not be effective at controlling the disease due to its extensive host range.

6. Bacterial leaf streak disease.

Category: Bacterium

Causal organism: Xanthomonas vasicola Pv. vasculorum

Symptoms:

The infected leaves initially show narrow stripes between the veins. The initial symptoms are generally confused with gray leaf spot disease. But the lesions from bacteria appear brown, orange, and/or yellow when you infected leaves are back-lit. Also, in Bacterial Leaf Streak disease the lesions show slightly wavy edges when compared to the smooth, linear lesion margins of gray leaf spot

Infestation:

The bacteria cause gumming disease on sugarcane in several part of the world. First reported on corn in South Africa.

Management:

Use healthy and disease-free seeds. Remove the infected plant debris and burn them. Follow crop rotation.

7. Bacterial stalk rot

Category: Bacterium

Causal organism: Erwinia chrysanthemi

Symptoms.

Plants suddenly beginning to lodge (bend to lie along the ground) midway through season; one or more internodes above soil line turning brown, water-soaked, soft and slimy; tissue has foul odor and mushy appearance;

Infestation.

Disease is most commonly found in plantations which have overhead irrigation systems or in areas with high rainfall; disease emergence is favored by high temperatures and high humidity.

Management.

Plow all crop debris into soil in Fall; plant corn in well-draining soil to prevent waterlogged plants

8. Maize dwarf mosaic

Category: Viral

Causal organism: Maize dwarf mosaic virus (MDMV)

Symptoms.

Chlorotic spots and streaks on leaves which develop into a mottled or mosaic pattern; susceptible plants may be stunted; ear formation and development cease; mosaic and mottling with no red discoloration are characteristic symptoms of the disease.

Infestation.

Virus is transmitted by more than 15 different species of aphid and is passed to the plant from the insect in seconds to minutes of feeding; sorghum is also a major host of the virus.

Management.

Many commercial corn hybrids are highly tolerant of the disease and no control is needed; control aphid populations on plants and remove any Johnson grass growing in the vicinity as it can act as a reservoir for the virus.

9. Maize lethal necrosis disease.

Category: Viral

Causal organism: Maize chlorotic mottle virus (MCMoV)

Symptoms.

The disease occurs at all stages of crop. The main symptoms include appearance of chlorotic mottling on leaves which starts from base and extends upwards. Also, the leaves show necrosis at margins which later extends to mid rib and results in drying

of entire leaf. The necrosis of young leaves in the whorl causes dead heart symptom. Other symptoms are premature plant death, shortened male inflorescences with few spikes, and/or shortened, malformed, partially filled ears.

Infestation.

The virus mainly spread by vectors (maize thrips, aphids, rootworms and leaf beetles) and infected seeds. The first report of this disease in Africa continent was in Kenya (2011). And later the disease spreads to other countries like Tanzania, Uganda and South Sudan.

Management.

Use healthy, disease-free certified seeds. Keep the fields free from weeds. Remove the infected plants and burn them. Control vectors by treating seed and/ foliar spray with suitable insecticide. Follow crop rotation with non-cereals at least for two seasons. Plant maize only in main rainy season instead of short rainy season. Grow available resistant varieties.

Pest and their management in Maize crop

The pest and insects that attacks on the maize crop are divided into different categories and as on them their management.

1. Aphids

: Myzus pericae

Order: Hemiptera

Family: Aphidiae

Symptoms.

Heavy infestations can result in curled leaves and stunted plants; honeydew secretions promote growth of sooty mold; corn leaf aphids are blue-green in color, peach aphids are green-yellow in color; aphids may transmit viruses when feeding.

Life cycle.

Aphid follow three stager of progression egg, nymph and adult.

- Nymph and adult cause damage by secreting honeydew which causes sooty mould and while eating they extract saliva which causes malformations on leaf tip.

- Moulting 4 times before reaching adult stage after adult stage they can have wings or they cannot have wings.

- The Aphids reproduces between two types of reproduction.

1. Homocyclic reproduction

2. Anholocyclic reproduction

1.Holocyclic reproduction.

In a homocyclic life cycle of reproduction, the aphid starts as an egg that is usually planted before winter from there is hatches into a fundatrix which is a wingless female aphid. Next, the fundatrix will create daughter alone their female will then go on to create both male and female. these male and female mate and create an egg that can survive the winter.

2. Anholocyclic reproduction. (A life cycle in which there is a complete lack of male insects .in this type of life cycle only viviparous parthenogenetic female are present throughout the year)

In an anholocyclic life cycle female aphids simply create live birth clones of themselves without the help of male .so the life cycle usually looks like they're a female aphid, which sometimes has wings and sometimes does not create a clone called an aptera. this aptera is unwinged and can survive the winter, then goes on to continue the cycle by creating more clone.

Management.

It is rare for aphids to reach levels that are damaging to the plant and no control is generally warranted as insecticide sprays will not prevent transmission of viruses.

2. Cutworm

: Agrostis epsilon

Order: lepidoptera

Family: Noctuidae

Symptoms.

Stems of young transplants or seedlings may be severed at soil line; if infection occurs later, irregular holes are eaten into the surface of fruits; larvae causing the damage are usually active at night and hide during the day in the soil at the base of the plants or in plant debris of toppled plant; larvae are 2.5–5.0 cm (1–2 in) in length; larvae may exhibit a variety of patterns and coloration but will usually curl up into a C-shape when disturbed.

Life cycle:

Cutworms develop through six to nine instars depending upon temperature and diet. When the larva reaches the fourth instar, they are big enough to actually cut the stalk of young plant upon maturation the larva dig deep underground and pupate in earthen cells. Adult moths crawl up to the surface through the tunnel made by the last. In the span of 2 months the moth completes the life cycle.

Management.

Remove all plant residue from soil after harvest or at least two weeks before planting, this is especially important if the previous crop was another host such as alfalfa, beans or a leguminous cover crop; plastic or foil collars fitted around plant stems to cover the bottom 3 inches above the soil line and extending a couple of inches into the soil can prevent larvae severing plants; hand-pick larvae after dark; spread diatomaceous earth around the base of the plants (this creates a sharp barrier that will cut the insects if they try and crawl over it); apply appropriate insecticides to infested areas of garden or field if not growing organically

Category: Nematodes

Any phylum (Nematoda or Nemata) of elongated cylindrical worms parasitic in animals or plants or free living in soil or water

1. Root knot nematodes

: Meloidogyne incognita

Order: Tylonchida

Family: Heteroderid

Symptoms.

Below ground we can see galls on the roots due to female nematode feeding. Above ground the plants are stunted, yellow and patchy in growth. Severely infested plant may die before harvest.

Life cycle.

There are four juvenile stages and four moults in the life cycle of *M. incognita*. The first stage juvenile develops in the egg, and the first moult usually occurs within the eggshell, giving rise to the second -stage juvenile, which emerges free into the soil or plant tissue. Once the nematode begins feeding on tissues of a favorable host, the second, third and fourth moults occur giving rise to the third, fourth and fifth or adult stages, respectively. Between moults, there is further growth and development of the reproduction system in the two sexes. Upon maturity the female deposits eggs and the life cycle is repeated. Its life cycle time is 4-8 weeks.

Management.

Deep summer ploughing helps in reducing nematode population. Follow crop rotation with nematode antagonistic plants. Grow resistant varieties. In severely infected field follow soil fumigation with suitable nematicide.

Category: Mites

A tiny animal that is related to and resembles the spider and often lives as a parasite on plant and other animals.

Spider mites.: Tetranychus urticae

Order: Trombidiformes

Family: Tetranychidae

Symptoms.

Leaves stippled with yellow; leaves may appear bronzed; webbing on underside of leaves; small kernel size; mites may be visible as tiny moving dots on the webs or underside of leaves, best viewed using a hand lens; usually not spotted until there are visible symptoms on the plant; leaves turn yellow and may drop from plant.

Life cycle.

Spider mites generally feed and reproduce on the lower leaf surface, but when population are high will readily infest the upper leaf surface. Spider mites complete a life cycle in 8 to 12 days at 30°C and in about 17 days at 20°C.

Overwintering may occur on many weed hosts in warmer climate, but female may also over winter in debris in a stage of diapause. egg is laid singularly, with female depositing 5 to 6 eggs 1 day with a total of depending on temperature in 4 to 9 days depending on temperature and the female have a preoviposition period of 1 to 2 days. Adults live about 30 days

Two spotted spider mites pass throughout the following development stage egg, larva, protonymph, deutonymph and adult. In the laeaval and nymphal stage, an active period and a resting period of roughly equal duration can be distinguished.

Management.

In the home garden, spraying plants with a strong jet of water can help reduce buildup of spider mite populations; if mites become problematic apply insecticidal soap to plants; certain chemical insecticides may actually increase mite populations by killing off natural enemies and promoting mite reproduction.

•Harvesting.

Generally, most varieties have a life cycle of 100-120 days from planting to harvesting. however, the exact time of harvest is generally affected by environment and other factors, like the product and use.

As considering this we have distributed the maize harvest into two categories.

1. Harvest maize for grain cultivation.
2. Harvesting for silage.

• Harvesting of maize for grain.

Moisture content level in the grains is the main indication for defining the Harvesting moment. preferred to be harvested when the moisture content has dropped below 35% to 30%. Many farmers wait till 25% to reduce machine losses. if the crop is used for human food consumption, the harvest can start earlier. waiting too long to harvest may increase the risk of lodging due to the drying of the stem more specially, when grain moisture drops below 15% the machine loses. Increase by 13%

• Harvesting of Maize for silage.

Maize that will be used for animal feed Harvest should be occur when the dry matter content of the whole plant is between 30%-38% to achieve maximum insolubility

Now one question came what happen of harvesting is delayed of it done earlier.

•Early stage harvesting (DM below 30%)

- 1.Yield and nutrients losses
- 2.Overly fermented silage
- 3.lower starch deposition protein degradation

•Delayed harvesting (DM higher than 35%-38%)

1. Reduce both the yield and the quality of the silage
2. Increase the damage of reheating
3. Increase fiber content decreasing the digestibility of the silage
4. Lead to mis fermentation

• Harvesting Method

• For grain.

Harvesting by hands is only preformed in small garden although if it is done in big field it will take about 30 to 100 for one person to harvest one Hectare field but if harvesting is done by machines as well mechanically by using threshing, shelling, combine machine .In this case ,the time needed to harvest by using the machine is at least 6 times less depending on the machine used .the efficiency of the grain harvest is estimated at 80%-90% .

• For silage

Farmers use field chopper. Generally maize plants for silo production are chopped at an average height of 10-20 cm (4-8) inches or maximum up to 45cm (18inches) .Ideally ,the chop length showed be 10-15mm but the particles can larger or smaller depending on the moisture level.

•Yield

: The average yield of maize in India is 3 tonnes per hectare as in 2020 for grain production.

: The production of maize for silage production is about 10-20 tonnes/hac .

: As production of in India in several years.

: 2016-2017 = 25.9 Mt

: 2017-2018 = 28.75 Mt

: 2018-2019 = 27.72 Mt

: 2019-2020 = 28.77 Mt

: 2020 -2021 = 31.65 Mt

• Use of produce

1. Poultry feed =47%

2. Starch = 14%

3. Cattle = 13%

4. Food = 13%

5. Processed food =7%

6. Export & Other's= 6%

• Post harvest

After harvesting farmer have two choices 1st he can sell his produce in market or he can store his produce in storage and wait for off season selling where he can get Higher rates compare to the seasonal rates

: In area where the storage facilities are not good enough can cost farmer up to 80% of the yield. In that case the farmer can store his grain in silos. Farmer can buy it or rent it an appropriate silo have smoothed, cover -padded, clean environment and dry with moisture insulation. Good acieration is also essential. The silo should be sanitized and not damaged.

:If the grain is storing for a long period of time about 6 months .the grain should be further dried to reach a maximum 13.5 % moisture content if it is using food feeding purpose the moisture content could be more.

: Although farmer can use some conservation like Propionic acid or a mixture of acetic acid and Propionic acid .it will not affect the nutritional value of grain.

: Chemical protection

Farmer can apply protective products with the following active compounds like - perimorphs methyl, (S)-Methoprene. It is advise to perform such treatment before planting the seeds in the storing bins, and in the case, the storing will lost more than a year . In higher temperature and humidity level. Grain protectant should be applied.

Furthermore, a large variety of fumigant insecticide can be used on the corn grains Stored in piles.

1. Aluminum phosphide

2. Carbon dioxide

3. Magnesium phosphide

4. Methyl bromide

5. Deltamethrin

: The farm should perform such application when the temperature exceeds about 15.5°C; but the humidity level remain close to 12-13%

: Insect occurs in maize storage

1. Maize Weevil.

Scientific name= Sitophilus Zea maize

Order = Coleoptera

Family= Curculionidae

It can feed on undamaged corn grains. It is very hard to detect an infestation in an early stage since the insects penetrate and stay inside the grains.

2. Lesser grain borer.

Scientific name= *Rhoizopertha dominica*

Order = Coleoptera

Family= Boskrichidae

The larvae can feed on damaged kernels. It is considered the most destructive insect of stored products in Africa. Additionally, to the damage, by feeding with the corn grains, it causes extensive losses due to the transition of fungi like *A. flavus*, *F. moniliforme*, and *P. islandicum*. The farmer should take controlled measures immediately when farmer finds 5 or more insects per trap.

3. Red rust flour beetle.

Scientific name=*Tribolium castaneum*

Order = Coleoptera

Family = Tenebrionidae

It thrives in temperate areas and can survive winter months in protected heated areas. It can feed on damaged kernels. Measurable losses will occur when more than 1,000 insects are detected per trap weekly.

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