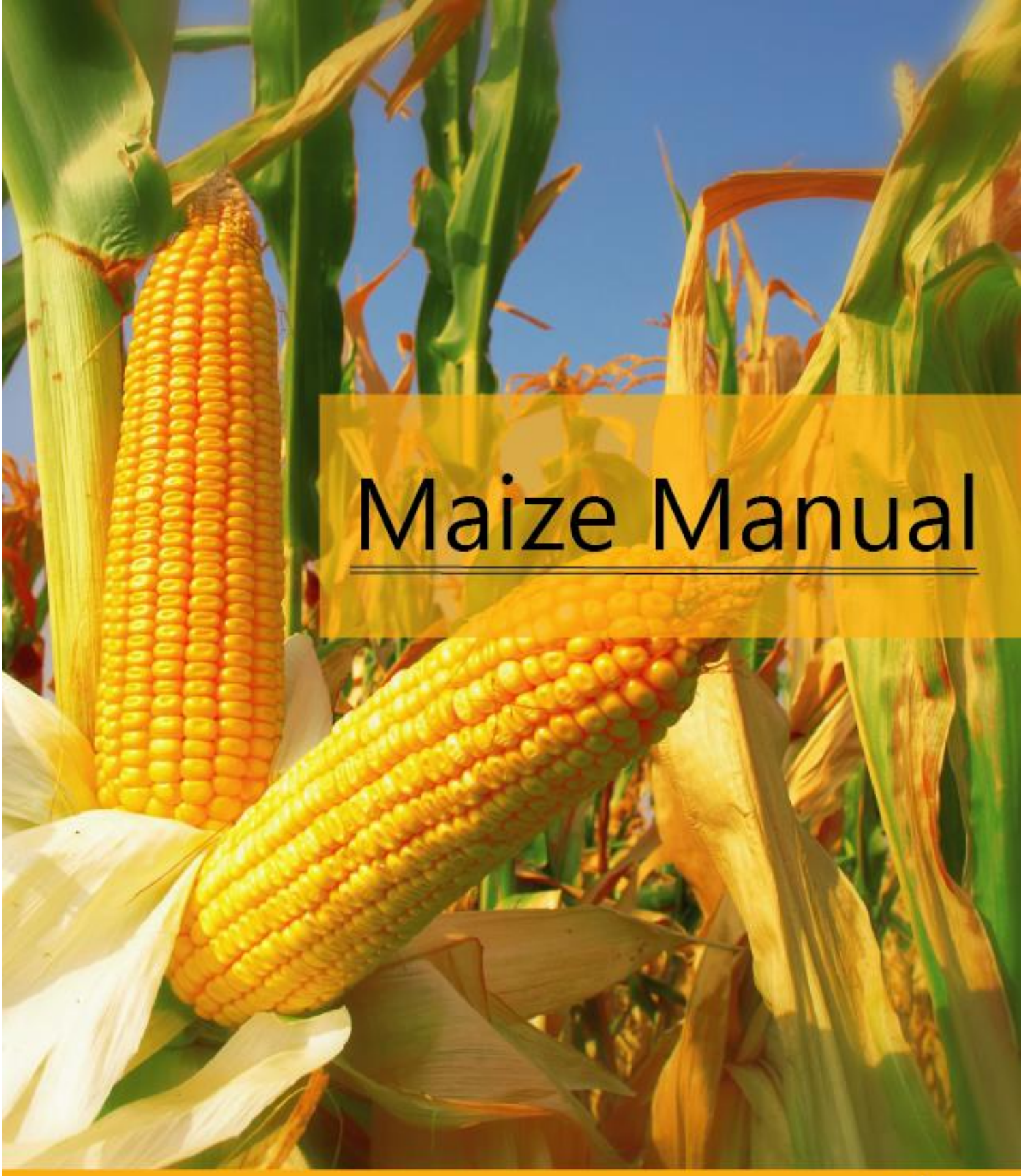

Maize Manual

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Introduction

- Maize botanical name is *Zeamays*
- Maize is also called corn
- Local name is MAKAI
- 3rd most important food crop and staple food in many countries (Latin America and Africa)
- It's a food,fodder, and biofuel crop
- Its starch is used in textile industry
- Corn oil is edible
- In Pakistan 2nd most important kharif crop
- It can be grown on different types of soils except sandy, clayey and salt affected soil.
- Best in medium texture soil with pH 6.5 – 7.5

Sequence of crops:

- In a year two crops of maize can be easily cultivated
- One in spring season and one in kharif
- Due to its harvesting in less time cropping sequence can be easily managed
- Due to better growing conditions spring season give more yield than kharif

Crop Rotation

Crop rotation should be adapted to minimize the pest proliferation especially stalk rot, borers, weeds and to maintain soil health. One-year crop rotation:

- Kharif maize – Wheat

- Potato – Spring Maize
- Kharif Maize – Barseem
- IRRI rice – Potato – Spring Maize
- Kharif Maize – Potato – Spring Maize

Two-year crop rotation:

- Kharif Maize – Wheat – kharif maize – Barseem
- Kharif Maize – Wheat – Cotton – Barseem

Varieties of Maize

Synthetic Varieties:

- Pearl (White)
- MMRI-Yellow
- Malika 2016
- Gohar-19 (White)
- Sahiwal-Gold
- SYMMIT-PAK (White)
- Pop–1
- Sweet-1

Hybrids

- FH-949,
- YH- 5427
- YH-1898
- FH-1046
- FH-1036
- YH-**5482**
- YH-**5568**
- Pioneer P 3939
- P 3025 W
- P 30Y87
- P 30T60
- P 31R 88

Monsanto

- DK 6714

- DK 6789

Importance of hybrids

- Hybrid varieties have more potential to give high yield.
- Hybrids have generally intensive root system and strengthen plant stand and nutrient uptake

Seed rate:

- 8 to 10 kg per acre to achieve recommended plant density
- Seed should be healthy, disease free with more than 90% germination percentage.

Seed treatment:

- To protect the seeds from diseases or insects during early growth stage seed should be treated
- Azoxystrobin + clothianidin 09 gm / kg seed
- Imidacloprid + tebuconazole 10ml / kg seed
- Azoxystrobin + clothianidin + fludioxonil 09 gm / kg seed

Time of sowing:

- End January to end February(Spring)
- 15 July to 15 August(Kharif)
- In Rawalpindi sow in 1st week of Jul (according to onset of Moonson season)

Land selection:

- Loamy soils and heavy fertile soils are recommended for cultivation of maize
- It should have good water holding capacity
- Water lodged soils and salt effected soils are not recommended

Preparation of land:

- Land must be well prepared for rapid and even seed emergence and root development.
- Deep plough to break hard pan
- If possible use sub soiler before one month of cultivation
- Land must be proper levelled, use laser leveler for this purpose
- 3 to 4 times plough should be given followed by Planker
- Residues of previous crop should be incorporate in to the soil with the help of Rotavator

Method of sowing:

- In irrigated areas sowing should be done on the ridges
- Distance between the ridges should be 2.25– 2.5 feet
- After that irrigate the land and sow the seed
- Rows direction should be east to west, seed on south side and on north side in spring season
- Plant to plant distance should be 6 inches for hybrid and 7 inches for other varieties in spring season maize
- In kharif crop for hybrid seed plant to plant distance should be 6 inches in spring while in autumn distance should be 7 inches and for other varieties should be 8 -9 inch

Plant population (per acre):

- For hybrid type, for spring 35000 and in kharif 30000
- In common varieties for spring 30000 and for kharif 23000 to 26000

Irrigation:

- Spring maize requires 12 to 14 irrigations
- Kharif maize requires 10 to 12 irrigations

Eradication of weeds:

- Maize field should be weed-free for at least first 45-50 days of sowing.
- If weeds are not controlled 30 to 50% decrease in yield occurs
- Hoeing should be done for weeds at small level
- recommended weedicides should be used for controlling weeds
- For pre-emergence spray of Atrazine + S Metolachlor 800ml/ acre
- For post emergence spray Mesotrione + S Metolachlor605 ml/acre

Fertilizer recommendations

For hybrid varieties

For low fertile soils:

N: P: K

119: 69: 50

- At time of cultivation 3 bags of DAP, 2 bags of SOP, 1/4THbag of urea
- 1.25 bags of urea at 5 – 6 leaves stage
- 1.25 bags of urea at 8 – 10 leaves stage
- 1.25 bags of urea before 15 days of flowering

For medium fertile soils:

N: P:K

92: 58: 37

- 2.5 bags of DAP, 1.5 bags of SOP
- After that 1 bag of urea at 5 – 6 leaves stage
- After that 1 bag of urea at 8 – 10 leaves stage emergence
- 1 bags of urea before 15 days of flowering

For fertile soils:

N: P:K

75: 46: 25

- At time of cultivation 2bags of DAP, one bag of SOP
- 1 bag of urea at 5 – 6 leaves stage.
- 3/4 bag of urea at 8 – 10 leaves stage.
- 3/4bags of urea before 15 days of flowering

For other varieties

For low fertile soils:

N: P:K

92: 58: 37

- At time of cultivation 2.5 bags of DAP, 1.5 bags of SOP
- 1 bags of urea at 3 – 6 leaves emergence
- 1 bags of urea at 8 – 10 leaves emergence
- 1 bags of urea before 15 days of flowering

For medium fertile soils:

N: P: K

80:46:37

- At time of cultivation 2 bags of DAP, 1.5 bags of SOP
- After that 1 bag of urea at 3 – 6 leaves stage
- After that 1 bag of urea at 8 – 10 leaves stage
- 3/4 bag of urea before 15 days of flowering

For high fertile soils:

N: P:K

70 35 25

- At time of cultivation 1.5
- 1 bag of DAP, 1.5 bags of SOP
- After that 1 bag of urea at 3 – 6 leaves stage. emergence
- After that 1 bag of urea at 8 – 10 leaves stage. emergence
- 0.75 bag of urea before 15 days of flowering

For rain fed areas:

Less rainfall areas:

N: P: K

34: 23:12

- One bag of DAP, 2 Bags of ammonium nitrate and 0.5 bag of SOP

For more rainfall areas:

N: P: K

46:34:25

- 1.5 bags of DAP, 1.5 Bags of ammonium nitrate and 1 bag of SOP

Use of zinc and Boron:

- In case of zinc and boron deficiency 21% ZnSO4 10 kg or 33 % ZnSO4 6 kg per acre
- In case of boron deficiency, 11 % boron 3 kg per acre

Diseases of maize:

Seed and seedling disease:

- This causes the seed unable to germinate or if germinate at 3 to 9 inch it dies

- It is caused by different fungi present in the soil
- Recommended fumigation should be done before sowing to protect seed from this disease

Stalk rot:

- Stalk rot of maize caused by *Erwiniacarotovora*
- Internally, the stalk turns into a soft mass of disintegrated tissue
- At this stage the plants usually topple over
- A foul odor accompanied with the presence of dipterous larvae on and in decaying tissues are main symptoms

Its causal organisms are:

- *Erwiniacryanthamae*
- *Macrophominaphaseolina*
- *Cephalosporiummaydis*

Eradication:

- Disease resistant varieties should be grown
- Recommended fertilizers should be added
- Fumigated seed should be sown
- Recommended plant to plant and row to distance should be maintained
- Recommended irrigations should be given
- Remove the diseased plants

Smut of maize:

- Its causal organism is *Ustilagomaydis*
- It's a fungal disease and due to this disease white of black galls are formed
- These galls appear at the leaves and due to spores of fungus grains are not formed

Eradication:

- Disease resistant varieties should be grown
- Effected fields can't be cultivated in next year
- Fumigate the seed

Late blight of maize:

- It's a fungal disease

Its causal organisms are:

- *Helminthosporiumturcicum* and *Helminthosporiummaydis*
- It's not only decreased the yield, but it also made fodder unfit for animals
- First symptoms on maize plants appear on the lower leaves
- Spots that occur later, caused by spores distributed by wind, show on upper leaves
- At the beginning of the infestation small, longish, watery stains arise which can grow into elongated bands of grey-green to light brown lesions

Eradication:

- Disease resistant varieties should be grown
- Effected fields can't be cultivated in next year
- Previous crop residues should be incorporated

Ear and grain rot:

- It's a fungal disease.
- Its causal organisms are: *Diplodiamaydis*, *Fusarium sp.*, *Nigrosporaoryzae*.*Penicillium sp.*, *Aspergillus sp.*
- The effects the quality as well as quantity of the grains
- It affects more in rain if at maturity stage of corn
- Symptoms are a white to pink or salmon-colored, cottony mold that occurs on single or multiple kernels scattered or clustered on the ear
- Decay often begins with insect-damaged kernels. Infected kernels are frequently tan or brown or have white streaks

Eradication:

- Disease resistant varieties should be grown
- Recommended fertilizers should be added
- Use of recommended pesticides against pests of grains
- After harvesting crops residues should combine and burn them

Pests of maize:

Termite:

Damage symptoms:

- Partial or total defoliation of maize seedlings
- But are principally damaging to maturing or mature maize plants
- Wilting, drying up and lodging of plants when the termites attack the main root system,

Shoot fly:

Damage symptoms:

- The attacked plants become unhealthy, stunted and yellow
- The leaves wither from top downwards
- Panicle formation is inhibited, and the plants die if attack is severe
- Honeydew secreted by the bug causes growth of sooty mold on leaves

Maize stem borer:

Damage symptoms:

- Damage to corn caused by common stem borer is characterized by wilting and/or dying of the upper leaves or by ragged irregular holes chewed in the newly unrolled leaves
- The "dead heart" is caused by the insect boring into the stalk at the soil level and tunneling upward

Jassid:

Damage symptoms:

- It damages the plant by sucking sap
- Due to which white spots formed on the leaves
- In cause of severe attack, it dries the leaves

Aphid:

Damage symptoms:

- Honeydew secreted by the bug causes growth of sooty mold on leaves
- Its effects photosynthesis
- Its effects grain formation

Cob borer:

Damage symptoms:

- Corn borer feeding weakens plants and slows their growth
- Severely damaged plants often snap off and fall over
- When peppers or mature corn ears are damaged, they are prone to rot

Harvesting of maize:

- Always harvest the crop at time
- Harvesting before time or after time cause severe decrease in yield
- Crop should be harvested when the crop reaches it maturity
- When the grain becomes hard it means that crop is ready for harvesting
- Dry the corns after harvesting
- Grains can be separated by Sheller
- At that time moisture is 15%

- For storage moisture should be less than 10%

Storage of maize

- For storage moisture should be less than 10%
- Aluminum phosphide tablets should be used in storage rooms

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