

Best Management Practices (BMP) of Maize Crop

FACT SHEET

Intended Audience

This document is prepared for field level extension workers, agricultural cooperatives and agro-vet leaderships and farmers to guide them on best management practices (BMP) for maize cultivation for high yield.

Context

Maize is the main crop of the hills and the second largest crop grown in Nepal after rice. It is one of the main sources of poultry feed. Despite technological advancement and improved varieties, the average national maize yield is still low (2.5t/ha). There are large gaps between potential yields of varieties and their yields in farmer fields. The lower yield in the farmer's field is mainly due to the lower adoption of improved varieties, poor management practices including fertilizer management.

Use of improved seed alone is not sufficient to increase crop productivity and economic returns. How other agricultural inputs, such as fertilizers and irrigation are managed is more important than improved seed alone for high crop production. Therefore, BMPs should be followed by effective use of available inputs and their local adaptation for increasing crop productivity considering economic factor and different socio-cultural aspects.

BMP of maize includes: i) planning for maize cultivation, ii) choose the most suitable variety for each field, iii) use of high quality seed, iv) proper field preparation and planting, v) keeping fields free from weeds, pest and diseases, vi) efficient fertilization, vii) hoeing and earthing up, viii) timely irrigation, and ix) timely harvesting , proper drying and storage..

Planning before crop production

A farmer must have a plan for maize production. Plan includes which field/ how much land is going to be planted with maize, what variety will be planted (and why), whether it is for sale or home consumption. S/he should be sure about source, quality and price of seed and fertilizer required. If equipments are to be hired, what is situation of availability and its cost. The farmer also estimates his/her other resources, such as how much FYM/compost s/he has, how many laborers s/he has in his/her own family and how many to be hired. S/he should have a schedule of activities, so that s/he can arrange the resources and implement the activities timely in a planned way.

Choose the most suitable variety

Fields differ in their soil type, soil fertility, irrigation facilities and agro-climate. Therefore, selection of a variety should be done according to the growing conditions to minimize the risk of crop loss and ensure higher yields. A suitable variety should give good yields, taste good, get high market price, etc. For higher yields and economic returns, improved high yielding variety should be selected against local traditional variety. Local traditional varieties are usually tall and lodge easily, are low yielding and susceptible to pest and diseases. On the other hand, improved varieties are usually of dwarf or medium height, resistant to pest and diseases, more responsive to inorganic fertilizer applications and can give high yields.

The popular varieties of maize are listed below considering their suitability to geographical area, days to maturity and yield potentiality, so that farmers may make a right choice of variety according to their need.

Table 1. Popular high yielding varieties of Maize

SN	Variety	Recommended areas	Days to maturity	Yield t/ha	Remarks
1	Khumal Hybrid 2	Summer plantation in mid hill, winter plantation in terai and inner terai	152- winter 138-Summer	9.08-winter 8.5-summer	Resistant to moderate drought during pollination

2	Deuti	Mid hills	130-135	5.7	Tolerant to tursicum leaf blight
3	Manakamana 3	1000 to 1700 masl of eastern, western and central regions	142	5.5	Tolerant to leaf blight and cob rot
4	Posilo Makai 1	East to West below 1600 masl in hill	145-155	5.3	High protein content
5	Rampur Composite	Terai, inner terai, river basin and mid hills	110-115	4.4	
6	Manakamana 1	Mid hills -summer, terai and inner terai in winter	120-130	4	
7	Arun 2	Terai and mid hills (below 1000 masl)	80-90	2.2	Early maturing
8	Resunga Composite	Mid and Western Regions between 700 to 1400 masl	127	5.2	Strong stalk and resistant to lodging

Use of high quality seed

Use of good seed reduces seed rate, produces healthy and strong seedlings, gives a uniform crop stand in the field, and results in higher yields. Good seed should be clean, pure and healthy.

Clean: contains no foreign particles--stones, soil particles and weed seed

Pure: contains only grains of only one variety

Healthy: full big grains, same color, no cracks

Maize being a highly cross pollinated crop, it is always better to use new seed (not from your own field) and for this *always buy certified seed that is pure and truthfully labeled*

Field preparation

Field should be well prepared to provide good condition to grow maize. A careful field preparation helps to make best use of available water and nutrients, and reduces weeds. For a good field preparation:

- Apply available organic manures (compost or farmyard manure) to the field at the time of ploughing the field to incorporate and mix evenly into the soils
- As far as possible, incorporate OM immediately after getting in the field (to avoid heaping in the field for days) to minimize nutrient losses from sun drying (volatilization), wind and rainfall (leaching and runoff)
- Make sure sufficient moisture is in the field for seed germination
- Prepare fine soil by using locally used tools or rotavators which helps to break clods or oxen pulled plough
- Level the field well using land leveler to conserve moisture which ensures better seed germination and even crop growth, reduces weed growth and makes irrigation easy

Planting: Seed rate, spacing, and sowing methods

- It requires 0.8 to 1 kg sd/kattha (25 kg/ha)
- In the well prepared field mark lines with the help of string (with knots at 25 cm) and pickets at spacing 75 cm
- Use spot placement stick to make two holes at 25 cm distance, one 5 cm deep for planting seed and another 7 cm deep to place fertilizer 5 cm away from the seed hole
- With the help of scup/spoon or other tool apply 3.6 gm mixture of DAP and MOP in each hole
- Cover the seed and fertilizer
- Check the field after about 7 days and plant seed in the hills where there is no germination
- Optimum time of planting and harvesting is important because during the flowering time temperature above 38⁰ C and below 10⁰C reduces the pollination which ultimately cause to low filling of grain in cobs.

Table 2. Cropping Calendar

Season /Month	Baisa kha	Jest ha	Ash ad	Shra wan	Bha dra	Ashw in	Kar tik	Man sir	Pau sh	Mag h	Falg un	Chait ra
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- In case of insect and disease infestation, contact with agro-vets, JT/JTA or other agencies providing services for crop protection
- Follow the instructions and use the control measures as advised by the technicians

Fertilizer management

Most soils provide small amounts of nutrients, resulting in poor crop growth and low yields. Fertilizers supply additional nutrients to the crop and support better crop growth and high yields. The amount of fertilizer required depends on crop variety, soil fertility, previous crop, agro-climate and yield target. In principle, the amount of nutrient taken by crop till harvest should be replaced by fertilizers. However, fertilizer application should be efficient and balanced to get maximum returns.

For efficient fertilizer management,

- Use organic manure whenever possible, preferably more on sandy soils
- Organic manure should be incorporated in soil at least two weeks prior to planting maize
- Use inorganic fertilizer based on soil type and crop variety following 4Rs (right source, right quantity, right time and right placement) of nutrient stewardships
- Apply all P and K and little N (Planting fertilizers) by spot placement or side dressing at the time of planting
- The basal dose fertilizers should be applied in band or spot placement
- Apply urea in two splits, one at 25 days (60%) after planting and another at 45-55 days (40%) after planting
- Apply fertilizer beside plant, preferably 5-7 cm below soil and cover it by soil
- The topdress urea should be applied by using 'spot placement stick' (SPS) about 5 cm away from the plant

Table 3. Fertilizer requirement for maize (120:60:40 kg NPK/ha)

Fertilizers	Required quantity (Kg/Kath)	Remarks
Planting fertilizers		
Compost/FYM	300-500	15-20 days prior to planting
DAP	4.3	Just before planting

MOP	2.2	Just before planting
Top-dress Fertilizer		
First top dress urea	4.2	After 25 days of planting
Second top dress urea	2.8	After 45 to 55 days of planting

Ref: Demos of NSAF

Earthing up

- First hoeing and earthing up is done about 25 days after planting, weeding and earthing up is also done at the same time
- Second hoeing along with weeding and earthing up is done when the plant attains knee height (40-50 days)
- Earthing up is done up to 5 cm high simultaneously during weeding and hoeing

Irrigation

- Irrigate maize field at least 5 to 7 times in winter and spring
- Irrigation is done in furrow made between the two rows of plants
- The critical times of irrigation are before urea top dress, tasseling stage, silk initiation in cob and milking stage of grain

Harvesting and drying

- When 90% of the cobs are dry maize crop is ready for harvest
- At the time of harvest the moisture content of grain should not be more than 25%
- To identify right harvesting stage of maize make sure that the deepen points in the core cob where cornel is in the cob is black (if the point is not black, wait for a few more days before harvesting)
- When crop is ready, harvesting is done manually during the sunny days
- Harvested cobs are brought to drying floor
- Cobs are kept in sun for a few days for further drying
- Protect the drying cobs from birds, rat, insect, animal

Shelling and drying

- When cobs are in small quantity, generally shelling is done manually

- Different types of corn shellers are available in the market, some of them are operated manually and others are operated by electricity
- After shelling, sun dry for two to three days till grain moisture comes down to 10 to 12% is recommended

Cleaning and storage

- Grain should be cleaned properly before storage
- Separate the grain for home consumption, sales and storage
- The cleaned and dried grain should be stored in metal bins, super green bags or locally built moisture proof stores
- NSAF field trials and demonstrations conducted across different districts produced three times more yield in comparison to the national average (Table 4).

Table 4: Yield of maize under different management practices in kg/ha

Management	National Yield average	Farmers management with recommended fertilizer		Recommended fertilizer with 4Rs	
Variety	Farmer choice	Farmer choice	Rajkumar (Hybrid)	Rampur Composite	Hybrid (Rajkumar)
Yield kg/ha	2,500	6,639	8,221	7,650	9,491
Yield difference	-	+4,139	+5,721	+5,150	+6991