FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Guide to Maize Production in Northern Nigeria

A.Y. Kamara, N. Kamai, L.O. Omoigui, A. Togola, F. Ekeleme, J.E. Onyibe

Revised Edition 2020

USAID
FROM THE AMERICAN PEOPLE

IITA
Transforming African Agriculture

FEED THE FUTURE NIGERIA INTEGRATED AGRICULTURE ACTIVITY

www.iita.org

Guide to Maize Production in Northern Nigeria

A.Y. Kamara, N. Kamai, L.O. Omoigui,
A. Togola, F. Ekeleme, J.E. Onyibe

March 2020

Published by the International Institute of Tropical Agriculture (IITA)
Ibadan, Nigeria

International address:
IITA, Grosvenor House,
125 High Street
Croydon CR0 9XP, UK

Headquarters:
PMB 5320, Oyo Road
Ibadan, Oyo State

ISBN 00000000000

Printed in Nigeria by IITA

Correct citation: A.Y. Kamara, N. Kamai, L.O. Omoigui, A. Togola, and J.E. Onyibe. 2020. Guide to Maize Production in Northern Nigeria: Ibadan, Nigeria. 18 pp.

Cover: Maize plant tasseling.

Forward and Acknowledgements

This handbook is intended to guide farmers, extension personnel, students of agriculture and researchers in Nigeria to use improved varieties and complementary production practices to increase productivity. The guide draws its lessons from the work and experience of IITA and partners in Research for Development on crop-based systems in Nigeria.

This publication is a production of the Feed the Future Nigeria Integrated Agriculture Activity implemented in targeted locations of Borno and Adamawa states, Nigeria between 2019 and 2021, and was made possible through financial support from the United States Agency for International Development (USAID).

As part of its contribution to the economic recovery process in the North East Part of Nigeria which has been ravaged by the insurgent activities of armed groups, USAID awarded to the International Institute of Tropical Agriculture (IITA) and its Partners (International Crops Research Institute for the Semi-Arid Tropics and Catholic Relief Services) the two-year "Feed the Future Nigeria Integrated Agriculture Activity'' which aims to advance the objectives of inclusive and sustainable agriculture-led economic growth; strengthened resilience among people and systems; and a well-nourished population, especially among women and children in targeted locations of Borno and Adamawa states, Nigeria. The Activity seeks to support vulnerable populations to engage in basic farming activities that will improve food security, increase agricultural incomes and improve resilience among smallholder farmers and their families. It works with a coalition of partners to facilitate improved agro-inputs and extension advisory services to serve vulnerable populations;

strengthen the institutions that form the market system and the networks that serve smallholder farmers who have been disenfranchised by conflict; and facilitate the engagement of youth and women in economic and entrepreneurial activities.

We acknowledge the many people who have contributed to the development of this handbook other than the listed authors, especially the leadership provided by the Deputy Chief of Party of the Feed the Future (FtF) Nigeria Integrated Agriculture Activity and the component lead Mr. Olukayode Faleti and all the other staff of the Activity for their tireless efforts and immense contribution towards the achievement of the Activity's objectives.

The Activity would also like to recognize the support and guidance provided by the Management of IITA led by the Director General, Dr N. Sanginga, Dr Kenton Dashiell, Dr Alfred Dickson, Dr Robert Asiedu, Dr. Gbassey Tarawali and others for their continued support to the Activity.

Finally, we thank Dr. Charles C. Iyangbe the Activity's AOR and his other colleagues at USAID who have provided their active support in terms of providing technical guidance in making sure we follow USAID rules and regulations and the documents are of quality.

Prakash Kant Silwal,
Chief of Party,
USAID Feed the Future Nigeria Integrated Agriculture Activity,
International Institute of Tropical Agriculture, IITA Abuja Station,
Kubwa, Abuja FCT, Nigeria.

Contents

Tables

Figures

Introduction

Production and importance of maize in Nigeria

Maize is a major cereal and one of the most important food crops in Nigeria. Its genetic plasticity has made it the most widely cultivated crop in the country from the wet evergreen climate of the forest zone to the dry ecology of the Sudan savanna. Being photoperiod insensitive, it can be grown any time of the year, giving greater flexibility to fitting into different cropping patterns. It is one of the dominant cereal crops in the Guinea and Sudan savannas in northern Nigeria.

Over the years, maize has become an important crop, taking over acreages from traditional crops such as millet and sorghum. In 2018, about 10.2 million tons of maize was produced from 4.8 million hectares, making Nigeria the highest producer in Africa (FAO, 2018). Research efforts by breeders and agronomists have led to the production of many technologies including the breeding of high yielding varieties that are tolerant to drought, diseases, low nitrogen, and Striga infestation (Kamara et al., 2014). Despite the availability of these varieties, yields are still low in the Nigerian savannas. This Guide aims to assist extension personnel and smallholder farmers in the use of agronomic technologies to increase the productivity of maize.

Climate and soil requirements for maize production

Maize is grown over a wide range of climatic conditions because of its many divergent types.

Temperature requirements

The maize crop requires warmth throughout the period of its active life. The greatest production potential lies in areas where isotherms in the warmest month range between 21 and 27 °C. Maize does not grow well in areas where the growing season temperature is less than 19 °C or where the average night temperature falls below14 °C. For this reason, proper timing of planting is required for dry-season cropping under irrigation.

Although maize can tolerate high temperatures up to 35 °C, yields usually decrease if the high temperature coincides with pollen shedding. Maize responds differently to changes in temperature at different stages of growth. During germination, the optimal temperature appears to be around 18 °C. Germination is low at temperatures below 14 °C, which may occur during the dry harmattan period. Cool, wet weather encourages many pathogens that cause seedling diseases and kernel rots.

Rainfall requirements

The amount and distribution of rainfall are highly important factors in successful production. A minimal range of 480–880 mm of well-distributed rainfall is adequate for maize, depending on the variety. The moisture requirements are small during the early stages of development but increase rapidly up to the flowering stage, before decreasing again as the crop matures. Maize is especially sensitive to moisture stress during flowering when a short spell of stress can reduce the crop yield by up to 30–35%. The ecological zones in Nigeria have been demarcated, based on rainfall and vegetation cover, and reflect divergence in cropping systems and production constraints. For the savannas, three ecologies have been identified for maize production: the southern and northern Guinea savannas and the Sudan savanna. Annual rainfall is about 1000 mm spread over 170 rainy days, between late May and early October in the southern Guinea savanna. Rainfall is about 800–900 mm spread over 150–160 rainy days. In the northern Guinea savanna. annual rainfall is rarely up

to 700 mm in the Sudan savanna, spread over about 120 rainy days. The potential for production varies remarkably, as well as the varieties adapted to these zones. The potential increases gradually from the Sudan to the southern Guinea savanna zones.

Maize production constraints in the Nigerian savannas

Poor soil fertility

Soil fertility in the savannas has progressively declined due to increased pressure on land resources arising from rapid population expansion combined with low use of fertilizers. The soil is deficient both in macronutrients, such as N, P, and K, and key micronutrients, such as copper and zinc. Therefore, the soil cannot support meaningful maize yields without proper fertilization. Yields as low as less than 1 t ha^{-1} can be obtained without the addition of fertilizer.

Figure 1. (a) A farmer's field left unfertilized. (b) A fertilized field.

Striga infestation

Striga (Fig. 2) is a major constraint to maize production. The level of infestation in northern Nigeria, in particular, is as high as 60% in the southern Guinea savanna, 68% in the Sudan savanna, and 74% in the northern Guinea savanna. Striga accounts for over 30–60% of the losses in maize grain yield. Hence, measures that minimize the effects of Striga need to be implemented to ensure good yields on farmers' fields.

Figure 2. Striga hermonthica on maize.

Drought

The amount of rainfall determines the growth and yield of maize, especially where irrigation is not feasible. In most parts of northern Nigeria rainfall is unreliable and frequently less than the amount required for a good crop. In the southern Guinea savanna where rainfalls are higher than in other zones, instability in their establishment frequently occurs and often compels farmers to replant maize. In the northern Guinea savanna, instability or late establishment of rains, and midseason and terminal drought conditions regularly occur. In the Sudan savanna, early season and terminal drought conditions are almost an annual event. Temperatures are high across the savannas in northern Nigeria, reaching a maximum of 40 °C in April and a minimum of 18 °C between December and January. This variability in annual rainfall/actual rainy days and monthly temperatures dictates the type of maize variety that can be planted in the respective zones. The length of the rainy days in each of the zones indicates the need to select appropriate varieties and cultural practices, such as the sowing date, that suit the prevailing conditions.

Figure 3. Maize affected by drought.

Fall Armyworm (FAW)

The most important pest of maize is the Fall Armyworm (FAW), *Spodoptera frugiperda* (Lepidoptera: Noctuidae), considered a native pest in the tropical and sub-tropical Americas. On the African continent, FAW is among the most destructive invasive pests. The larvae, which are light green to dark brown with longitudinal stripes (Fig. 4) feed in large numbers on the leaves, stems, and reproductive parts of plants. The pest affects more than 350 plant species causing severe damage to cultivated crops, such as maize, rice, sorghum, sugarcane, etc. (Fig. 5). The host crop most susceptible to FAW is maize, a high-priority food crop across many sub-Saharan countries. Annual loss from FAW was estimated at up to 17.7 million t of maize from 12 African countries, enough to feed tens of millions of people and representing an economic loss of up to US$4.6 billion (FAO, 2018). In Nigeria, FAW was first reported in Oyo and Ogun states in 2016. Currently, the pest is present in all the states of the country as well as the Federal Capital Territory (FCT). Losses up to 100% have been recorded in some farmers' fields. The pest is very difficult to control, and management in maize fields necessitates the frequent application of insecticides and sometimes the use of multiple types and formulations of chemicals. The eggs are 0.4 mm in diameter and 0.3 mm in height; they are pale yellow or creamy at the time of oviposition and becomes light brown prior to eclosion. Egg

maturity takes 2–3 days when the temperature is between 20 and 30 oC. Eggs are usually laid in masses of approximately 150–200 eggs, which are laid 2–4 layers deep on the surface of the leaf. Egg masses may be laid on the undersides too, or on top of the leaves.

Control

In Nigeria some insecticides are in the market that can control FAW if applied in the first 3 weeks after planting. For example, the chemical called Kartodim 315 EC (with a.i. lambda-cyhalothrin plus dimethoate) should be applied once per week for 3 weeks after planting maize. For effective control, use 50–60 ml in 15-L knapsack sprayer or 70-80 ml in 20-L knapsack sprayer . The use of alternative control measures such as host plant resistance, biological control (Sterile Insect Technique, parasitoids, predators, entomopathogens), and botanical pesticides is more desirable but less effective than using chemicals.

Figure 4. Fall Armyworm (*Spodoptera frugiperda*).

Figure 5. Maize plants affected by the Fall Armyworm.

Cultural practices

Land preparation

Land preparation in the savannas is not as rigorous as in the forest zone of the country. In the Guinea savannas, where vegetation cover is fairly dense, land clearing should be carried out well ahead of the rains. Suitable ridges should be made as soon as the rains start. Although the crop benefits from deep cultivation, yields are not reduced when zero tillage is adopted. For high grain yield, maize should be sown in well-prepared ridges 75 cm apart. Because the soil in northern Nigeria is loose, animal-drawn implements can be used for preparing ridges, or these can be made by hand, hoe, or tractor mounted tillage equipment (Fig. 6).

Figure 6. Making ridges.

Planting date

Planting should be done as soon as the rains are established and preferably immediately after a good rain. The establishment of rains varies according to the different ecological zones in northern Nigeria and from one year to another. However, optimal planting dates in the major ecological zones usually lie within the following ranges:
Sudan savanna: first - second week of July.
Northern Guinea savanna: last week in June to the first week in July.
Southern Guinea savanna: mid-May to the second week in June.

Early planting in the season, after the establishment of the rains, is a good opportunity to further increase yields. Early planting enables the crop to benefit from the early release of nitrates in the soil, as well as reduced incidence of insects and diseases. However, where early and extra-early maturing varieties are not to be eaten green, planting may be adjusted in the southern parts of the State to mid-July to allow maturity to coincide with the onset of the dry season.

Maize varieties

The breeding of stress-tolerant or resistant and well-adapted consumer acceptable varieties is an aspect where research has generated commendable results. These improved varieties combine drought and Striga resistance with increased yield potential, appropriate maturity period, and grain quality. Farmers are strongly advised to use the most common and adaptable varieties or hybrids recommended for their areas (Tables 1 and 2) or to contact the nearest agricultural extension agent in the State Agricultural Development Program for assistance. Farmers are also advised to purchase certified seeds from reputable sources, such as seed companies or their agents and community-based seed production associations.

Table 1. Open-pollinated maize varieties (OPV) recommended for northern Nigeria.

Ecology	Varieties	Remarks
Southern Guinea savanna	SAMMAZ 15 (IWDC2Syn-F2-W) SAMMAZ 40 (DTSTR-Y SYN2) SAMMAZ 51 (IWD C3 SYN/DTSTR)	Use in areas where drought and Striga are problems.
Northern Guinea savanna	SAMMAZ 15 (IWDC2Syn-F2-W) SAMMAZ 27 (EV 99DT-W-STR) SAMMAZ 40 (DTSTR-Y SYN2) SAMMAZ 48 (2011 TZE W-DT) SAMMAZ 51 (IWD C3 SYN/DTSTR)	Use in areas where drought and Striga are problems.
Sudan savanna	SAMMAZ 27 (EV 99DT-W-STR) SAMMAZ 48 (2011 TZE W-DT) SAMMAZ 32 (99 TZEE-STR-QPM)	Use in drought-prone areas and areas with a short season. Where Striga is a problem, use extra-early and drought escape varieties.

Table 2. Maize hybrids recommended for northern Nigeria.

Ecology	Hybrids	Remarks
Northern Guinea and Sudan savannas	P48W03	Prolific, combines host plant resistance to Striga and tolerance to Metsulfuron methyl (MSM) for Striga control (4.5 t/ha).
Guinea Savanna	DK777	High grain yield, good stay-green characteristics, and tolerance to S. hermonthica (10.9 t/ha).
	SC719	High yield and large grain size (12 t/ha).
	SC651	Tolerance to drought and S. hermonthica. High yield potential and good husk cover (9.7 t/ha).
	P48W01	Combined host plant resistance to Striga and tolerance to Metsulfuron methyl (MSM) for Striga control. (5 t/ha).
Guinea savanna and Forest Ecology	30Y87	High yield, excellent stay-green characteristics, uniform ear placement and good standability (12.0 t/ha).
	Oba Super 6	More adapted to Southern Guinea Savanna, Northern Guinea Savanna and Sudan Savanna ecologies, high yield, drought tolerance, low soil nitrogen-efficient, excellent plant, and ear aspect. (7–8 t/ha).

Seed treatment

It is recommended that seeds for planting should be dressed with the appropriate dressing chemicals before being planted to protect them against soil pests, diseases, and bird attacks before or after germination. Some recommended chemicals include marshal 2% dust, Apron Star, and other approved seed dressing chemicals. A packet of 10 g may be adequate to treat between 2 and 5 kg of seeds, depending on the brand of seed dressing chemical used. Most seed dressing chemicals have red-pink pigment colors that help in distinguishing treated and untreated seeds. In using seed dressing chemicals, half of the quantity a sachet can treat (for example, 2 kg) should be put in a closed container, and half of the contents of the dressing chemical poured on it. The other 2 kg of seeds are later poured in, and the remaining chemical is emptied into it, and the mouth of the container is sealed. The whole content is then shaken

vigorously for about 3 minutes until the seeds are well coated with the dressing powder. It is essential for the farmers to wash their hands thoroughly with soap and water after dressing the seeds and after planting treated seeds.

Spacing and planting

The plant spacing recommended for maize in the Nigerian savannas is 75 × 50 cm, where 2 plants per stand are adopted (Fig. 7). Maize may be planted either manually (hand planting) or mechanically.

Figure 7. Spacing at planting.

Seed rate

About 15–20 kg of maize seeds is required to plant a hectare, which is about 2½ acres. Plant 3 seeds per hole and later thin the stand to 2 plants at about 1–2 weeks after germination. When maize is grown as an intercrop, the spacing should be wider than for sole cropped maize. The practice of alternating rows of maize with other crops is highly recommended as it will allow the adoption of recommended packages for each crop.

Fertilizer application

For high yield, adequate and balanced nutrition is important in maize. Ensure proper thinning of the plants to recommended stand density then conduct weeding before fertilizer application. The following fertilizer nutrients are recommended per hectare for maize in the savannas; 100 kg N, 50 kg of single super phosphate (SUPA), and 50 kg of muriate of potash (K20). This recommended fertilizer rate should be applied in two split applications. The first dose (that is 50:50:50) should be applied at planting or within the first week of planting using about 6 bags of NPK 15-15-15. The second dose of N (50 kg, about 2 bags of urea) should be applied between 4 and 5 weeks after planting in the Southern and Northern Guinea savanna zones, but between 3 and 4 weeks after planting for extra-early varieties in the Sudan savanna.

Figure 8. Fertilizer application.

All fertilizers should be buried during application. Ensure that the second weeding has been conducted before the second fertilizer dose is applied.

Note that delay in the application of the first dose of fertilizer beyond week 1 after planting will drastically reduce the grain yield of early and extra-early varieties. Also, the second dose should not be delayed beyond 4 weeks after planting. Fertilizer should be applied in small quantities of 2 coca cola caps filled with NPK (Fig. 8) 1 week after planting. One coca cola cap filled with urea should be applied at 4 weeks after planting. The fertilizer should be poured into a hole made with a stick at a distance of about 5–8 cm away from the maize plant and below the soil surface. Do not leave applied fertilizers exposed on the soil surface. Always cover applied fertilizer with soil.

Weed control

Good control of weeds in maize is a prerequisite for high yield. Weeds usually compete with the crops for nutrients, sunlight, and water. To permit the maize crop to express its full potential on the field, regular weeding is necessary. Timely weeding is essential, especially at the

early stages of growth. Since the crop is shallow-rooted, it is very important to ensure that no mechanical damage is done to the crop roots during this operation. In cases where soil erosion is becoming significant, earthing up or remoulding of ridges will be essential to prevent lodging and excessive exposure of the roots to the sun.

In many parts of the Nigerian savannas, *Striga* is a notorious parasitic weed that has continuously posed a great threat to maize production. Under severe infestation, even before the emergence of Striga, the maize plants are usually severely attacked and look yellowish, stunted, and wilting. To effectively control Striga, the various methods need to be implemented in an integrated way and should include rotation with soybean, use of tolerant/resistant varieties, and application of the recommended fertilizer rate, with other cultural practices.

Manual weed control

Two manual weedings are recommended to be conducted at 2 weeks and 4–5 weeks after planting. In areas where *Imperata cylindrica* is a problem, weeding may start as much at 2 or 3 weeks after planting, and more than 2 manual weedings may be required.

Chemical weed control

Wherever economically feasible to do so, herbicides can be used to control weeds on a maize farm. Although some have been recommended for sole cropped maize, it is important to note that the effectiveness of the herbicides is enhanced by very good land preparation, whatever implements are used. The increasing problem of lack of appropriate labor has increased the adoption of chemical weed control. The herbicide recommendation provided in Tables 3 and 4 is for both largescale and peasant farmers.

Table 3. Chemical weed control in maize

Product	Rate/ha	Estimate for 15-liter sprayer	Condition of use	Remarks
Glyphosate	4 liters	350 ml	Before land preparation	Application rate will depend on formulation and label rate. Wait for 10 days after application before preparing the land.
Atrazine	5–6 liters of liquid or 2.5–3 kg of powdered atrazine	400 -–500 ml	Apply immediately after planting or the following day after planting	Dissolve atrazine powder in clean water before use at the rate of 1 kg in 1 liter of clean water. Thus, the 3 kg should be dissolved in 3 liters of water. This will give about 6 liters of liquid atrazine. Do not apply atrazine if you intend to intercrop the maize crop with legume crops (cowpea, groundnut and soybean)
Primextra Gold	3–4 liters	250 -–300 ml	Apply immediately after planting or the following day. Up to 4 liters/ha is recommended for the forest transition zone.	Note that about 150 ml of the liquid chemical will fill one container of liquid peak milk of standard size
Dual Gold 960 EC	0.6–1.6 liters	50–130 ml	Apply immediately after planting or the day after planting.	

Note: About 12 loads of 15-liter sprayer are required for a hectare. Where animal power is used to conduct land preparation, allow rain to fall on the prepared land before planting. Spray herbicides immediately after planting or the day after planting to enhance effectiveness. Good land preparation is a pre-requisite for effective weed control in maize. Where land preparation has been poorly done and weeds are present at planting, apply glufosinate ammonium at the label rate.

It should be noted that the actual quantity of water required varies with individuals applying the herbicide due to the following factors:

- Speed of travel or movement of the person performing the spraying.
- Swath width (width of land area covered in one pass).
- Spray pressure of the equipment (force at which the spray is being released).
- Nozzle orifice (size of the opening in the tip of the nozzle in the sprayer).

The sprayer should be calibrated each time herbicides are to be applied in order to enhance efficacy.

Pests and diseases

Dressing the seeds prior to planting easily controls most of the diseases (whether soil-or seed-borne). A few pests such as stem borers, and grass hoppers occur occasionally and rarely present any serious challenge.

Harvesting

When maize is to be consumed fresh, harvesting should be conducted when the silk has turned brown (50–70 days after planting). But when grain is needed, harvest as soon as the grain is dry enough (80–110 days after planting) depending on the variety. During harvest, the cobs can be broken by hand from the plant or the whole plant can be cut with a cutlass (Fig. 9). Where the entire plants are harvested, they are often stacked in the field to allow the grain to dry further. In the humid zones, the crop can be dried in a traditional ventilated granary.

Figure 9. Allow maize to dry properly before harvesting.

Postharvest processing.

Maize shelling can be done by any one of the following methods.

Hand shelling

- Use of internally ribbed tubes, beating cobs with a stick.
- Using a single intake disc (hand-operated).
- Using double intake disc (maybe hand/pedal/engine- operated).

The method to use is determined mainly by output, although engine-operated multi-crop threshers used on a contract basis are gradually becoming popular.

Grain cleaning. This can be done using the wind for winnowing or with screens of proper size.

Yield. The average yield of maize in Northern Nigeria is about 2500–3500 kg/ha of threshed grain using recommended fertilizers, varieties, seed-dressing, and improved cultural practices.

Storage pests and control

Maize meant for future use should be dried to 10–12% moisture content and properly stored. In small-scale production, farmers store quantities over fireplaces and on the roofs of houses. For slightly larger scale production, they will harvest the crop when it is reasonably dry and then store it in freely ventilated stores or granaries that allow air to pass through the crop and continue the drying process. The store or granary should be very clean before and during storage. This is aimed at preventing the loss of grain due to storage pests.

The major storage pests of maize are grain weevils (*Sitophilus* spp. and *Tribolium* spp.). Infestation may be by insects already present where maize grain had previously been stored, or by cross-infestation between stores, or by cross-infestation between granaries during storage. In some cases, an infestation may start on the field, especially when maize is left for too long before being harvested.

Apart from the hygienic condition of the granary, chemical control measures can also be used. Maize that will be stored for 6 months or more should, in addition to hygiene in the store, be treated with phostoxin

How to apply phostoxin for proper storage

The walls and floor of the *rumbu* or granary must be cleaned thoroughly. Phostoxin tablets or pellets may be used to store more maize in an airtight container or large storage in sacks. Large-scale storage in bags such as pyramids will require a complete cover with tarpaulin after application with 4–6 tablets or pellets per ton, (wrapped in newspaper) in some of the bags. The tablets or pellets could also be enclosed in perforated envelopes instead of newspapers. Such storage should not be disturbed frequently for greater effectiveness. For fumigants to be effective, they must be applied where there is air-tight storage condition in sacks, containers or buildings. For bagged produce, the rate is 1-2 tablets per 100 kg grain sack. The tablet is wrapped in small tissue paper and placed in the middle of the sack. Also, grains must be properly dried; below 12 percent moisture level before storage to avoid mold. Clean granaries and stores before filling with new grains. A farmer can buy these chemicals from reputable agro chemicals dealers or retailers in towns and cities

Note: Whenever phostoxin tablets are used, ensure the store is airtight to avoid the escape of fumes that are poisonous to human beings and animals when inhaled. For non-chemical storage, farmers are advised to store maize in Purdue Improved Crop Storage (PICS) bags.

Marketing

The present level of maize production in the country is beyond the traditional consumption levels. Increased production has been prompted by the rapid development of the poultry industries and an increase in population. As is common with most crops, the price is usually lowest during the harvest period and increases during the period of scarcity. Farmers are advised not to rush all their harvest to the market immediately after harvest but to provide good storage to derive more profits by selling when demand for grain is highest. The farmers have many sources for the sale of their maize, including buyers that come from neighboring countries, especially, Bénin, Chad, and Niger Republics, and should take the advantages of the opportunity to sell to the highest bidder which is tenable at some times between March and August of every year.

Summary

For an optimal yield of maize, follow these recommended practices. Use the variety recommended for your zone. Choose a good site. Prepare the land well. Use correct spacing when sowing. Thin and weed at the appropriate time. Control FAW within first 3 weeks after maize planting. Apply the right amounts of fertilizer at the right time and method. Harvest carefully and dry your crop thoroughly before storage. Protect grain against storage pests. Perform all farm operations at the right time.

References

Kamara, A.Y., S.U. Ewansiha, and A. Menkir. 2014. Assessment of nitrogen uptake and utilization in drought-tolerant and Striga resistant tropical maize varieties. Archives of Agronomy and Soil Science 60: 195–207. doi:10.1080/03650340.2013.783204

FAOSTAT, FAOSTAT statistics database, (2017). https://search.library.wisc.edu/catalog/999882363002121.

Who we are

IITA is the lead research partner facilitating agricultural solutions for hunger and poverty in the tropics. It is a member of the CGIAR Consortium, a global research partnership that unites organizations engaged in research for sustainable development for a food secure future.

USAID
FROM THE AMERICAN PEOPLE

IITA
Transforming African Agriculture

FEED THE FUTURE NIGERIA INTEGRATED AGRICULTURE ACTIVITY