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Full Length Research Paper

Cereals production in Nigeria: Problems, constraints and opportunities for betterment

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Nigeria agriculture is characterized by small holdings, low capitalization and low yield per unit of land. Cereal crops are the major dietary energy supplier all over the world and particularly in Nigeria. In most part of Africa, cereals supplies about 80% of the energy requirements. Major cereals produced in Nigeria include rice, sorghum, maize, sugar cane and pear millet. They are the mostly grown in the savannah agro ecological zone of the country. Factors militating their level of productivity include climatic factors (rainfall, temperature and solar radiation), edaphic factors, migration, government policies, use of local varieties, predominance of weeds, pest and diseases and the scourge of HIV/AID. Solving Nigeria cereal problems is an indirect and powerful approach to alleviate poverty and improve the standard of living for Nigeria farmers. There is the need to have a systematic collaborative research to find solution to the problems posed. The government should be consistent in its agriculture policies such as provision of credit facilities, ban on importation of cereal crops and subsidizing agricultural inputs.

Key words: Nigeria, cereals, production, problems.

INTRODUCTION

Agriculture is the main stay of Nigerian economy. It involves small scale farmers scattered over wide expanse of land area, with small holding ranging from 0.5 to 3.0 hectare per farm land. It is characterized by rudimentary farm systems, low capitalization and low yield per hectare (Kolawale and Ojo, 2007). The roles of agriculture remain significant in the Nigeria economy despite the strategic importance of the oil sector. Agriculture provides primary means of employment for Nigeria and accounts for more than one third of total gross domestic product (GDP) and labour force (Babatunde and Oyatode, 2005).

Cereals are those members of the grass family, the Poeceace grown for their characteristic fruit, the caryopsis, which have been the most important sources of world's food for the last 10,000 years (Onwueme and Sinha, 1991). Wheat and barley are the oldest cultivated cereals. Their cultivation started in the fertile crescent of Mesopotamia some 10,000 years ago, this region now include parts of Turkey, Syria, Iraq and Iran (Onwueme and Sinha, 1991).

The major cereal crops in Nigeria are rice, maize, sorghum, wheat, pearl, millet, sugar cane and fonio millet with rice ranking as the sixth major crop in terms of the land area while sorghum account for 50% of the total cereal production and occupies about 45% of the total land area devoted to cereal production in Nigeria (national extension agricultural research and liaison station (NEARLS, 1996).

The role of cereals to modern society is related to its importance as food crop throughout the world. In most

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parts of Asia and Africa, cereals products comprise 80% or more of the average diet, in central and western Europe, as much as 50% and in the United State, between 20 - 25% (Onwueme and Sinha, 1991).

Cereals are the major dietary energy suppliers and provide significant amount of protein, minerals (potassium and calcium) and vitamins (vitamin A and C) (Idem and Showemimo, 2004). Cereals are consumed in a variety of forms, including pastes, noodles, cakes, breads, drinks etc. depending on the ethnic or religious affiliation. The bran, husk, plant parts and other residues (after processing) are useful as animal feeds and in the culture of micro-organism. Wax syrup and gum are extracted from cereals for industrial purposes. Different Nigeria ethnic groups use cereal crops residues for different purposes.

More than 70% of the working adult populations in Nigeria are employed in the agricultural sector directly or indirectly and over 90% of Nigeria's agricultural output comes from peasant farmers who dwell in the rural areas where 60% of the population live. The vast majority of these farmers have limited access to modern input and other productive resources are unlikely to have access to pesticides, fertilizers, hybrid seeds and irrigation without some form of public sector intervention (Ogunwole et al., 2004). Some of major problems militating cereals production in Nigeria are climatic factors (rainfall, temperature and solar radiation), soil factors, migration, socio-economic considerations and government policies, pests and diseases among others.

The rate of growth of Nigeria's food production is 2.5% per annum in recent years, while food demand has been growing at the rate of more than 3.5% per annum due to high rate of population growth of 2.83% (Kolawole and Ojo, 2007). This paper attempts to make available new vital information that could help in increasing cereals production to meet the ever increasing Nigeria demand for both its human and animal population.

PROBLEMS MILITATING CEREALS PRODUCTION IN NIGERIA

Cereals production area of Nigeria

The Nigerian savannah ecology is the major cereal production area in Nigeria. It accounts for about 665,600 square kilometres (about 67 million hectares), which also represent about 70% of the geographical area of Nigeria (Idem and Showemimo, 2004). It is located between latitude 07° to 14°N and longitude 03° and 15°E. Ogungubile and Olukosi (1991) stated that 85% of country's land mass lies within the savannah region. They equally stated that more than 70% of the population that live in savannah region of Nigeria depends largely on small subsistence farming. West Africa alone produced 49.1 and 51.4 million tones of 139.5 and 144.7 in 2005 and 2006 respectively, of Africa cereal production and Nigeria accounts for more than 60% of West Africa's cereals production (Table 1).

Climatic potential and constraints to cereals production in Nigeria

More than ever before, the issue of climate change has become more threatening not only to the sustainable development of socio economic (including agriculture) activity of any nation but to the totality of human existence.

This consequently informed the response of the United Nation general assembly by establishing in 1990, the Inter-government negotiation committee (INC) that drafted Negotiation and subsequently adopted the united nation framework convention on climate change (UNFCCC) on 9 May, 1992. When opened for signature in June, 1992, Nigeria was among the first set of 154 countries that signed the convention which entered into force on 21st March, 1994. Nigeria ratified the convention in August, 1994 (Adejuwon, 2004). The effect of climate change can be seen with incessant flood disaster witness in recent years in some part of the country. Several crop production fields and farm lands were destroyed. Farmers have been experiencing terminal drought in the same production field where flood has occurred (Gana et al., 2000).

By the virtue of Nigeria's location primarily within the lowland humid tropics, the country is generally characterized by a high temperature regime almost throughout the year. The important climatic factors that militates cereals production in Nigeria are discussed below:

Rain amount and characteristics

Rainfall is primary source of agricultural water for cereal crop production in Nigeria. The rain fall distribution ranges from a unimodal patter of the Sudan, Sahel and the Northern Guinea with annual precipitation of 400 – 600 mm to the bimodal pattern of the Southern Guinea with annual rain fall of 1100 – 1400 mm (Anon, 1989). The inter-annual variability of rainfall particular in the northern part is large, often results in climate hazards, especially floods and droughts with devastating effects on food production and associated with calamities and sufferings.

Despite the great potential of Nigeria in cereal production, the frequent occurrence of drought occasioned by erratic rainfall distribution and/or cessation of rain during the growing season is the greatest hindrance to increased production and this is more serious in the northern part of country where most of the cereals are produced (Olaoye 1999).

According to Idem and Showamimo (2004), the seasonal character of rain is reflected in the agricultural pattern of the Savannah, two distinct rainfall peaks and

Table 1. Africa cereal production (million tonnes).

	Wheat			Coarse grains			Rice (paddy)			Total cereals		
	2004	2005 Estim	2006 F'cast	2004	2005 Estim	2006 F'cast	2004	2005 Estim	2006 F'cast	2004	2005 Estim	2006 F'cast
Africa	22.4	21.0	24.9	89.4	97.8	97.8	19.4	20.8	22.1	131.2	139.5	37.7
North Africa	17.2	15.4	18.7	12.9	11.7	12.4	6.4	6.2	6.6	36.5	33.2	37.7
Egypt	7.2	8.2	8.3	7.8	8.7	8.0	6.4	6.1	6.5	21.3	23.0	22.8
Morocco	5.5	3.0	6.3	3.0	1.3	2.7	0.0	0.0	0.0	8.6	4.3	9.0
West Africa	0.1	0.1	0.1	35.2	39.9	41.7	8.1	9.2	9.7	43.4	49.1	51.4
Nigeria	0.1	0.1	0.1	20.9	22.4	24.1	3.5	4.2	4.8	24.5	26.6	28.9
Central Africa	0.0	0.0	0.0	2.9	3.0	3.1	0.4	0.4	0.4	3.3	3.5	3.5
East Africa	3.2	3.3	3.6	20.7	24.8	24.9	1.2	1.4	1.6	25.1	29.5	30.1
Ethiopia	2.2	2.4	2.5	7.9	9.3	9.3	0.0	0.0	0.0	10.0	11.7	11.7
Sudan	0.4	0.4	0.6	3.1	5.0	4.8	0.0	0.0	0.0	3.5	5.5	5.4
Southern African	1.9	2.2	2.5	17.7	18.4	15.8	3.3	3.7	3.8	22.9	24.2	22.0
Madagascar	0.0	0.0	0.0	0.4	0.4	0.3	30.0	3.4	3.5	3.4	3.8	3.8
South Africa	1.7	1.9	2.2	10.3	12.3	7.0	0.0	0.0	0.0	1.2	14.2	9.2
Zimbabwe	0.1	0.1	0.1	1.1	0.7	1.4	0.0	0.0	0.0	1.2	0.8	1.5

Source: Food and Agricultural organization.

Table 2. Rainfall data from 2003 - 2007 at Badeggi in Bida Niger State.

	2003	2004	2005	2006	2007
JAN	26.7	0.0	0.0	0.0	0.0
FEB	0.0	0.0	0.0	0.0	0.0
MAR	0.0	0.0	16.4	15.6	1.7
APR	20.0	57.7	44.9	28.5	130.5
MAY	210.1	177.0	143.9	167.1	149.2
JUN	169.4	162.6	166.5	187.9	221.5
JULY	238.4	143.8	330.5	225.3	207.0
AUG	151.7	355.9	188.9	331.6	275.7
SEP	162.8	148.8	194.0	138.0	283.8
OCT	72.9	135.6	122.4	37.6	27.3
NOV	36.0	0.0	0.0	0.0	0.0
DEC	0.0	0.0	0.0	0.0	0.0
Total	1,088.0	1,181.4	1,207.5	1,131.6	1,197.7

Source: National cereals research institute (NCRI) 2008, Badeggi, Bida - Niger State.

two growing seasons occur south of the latitude 9°N referred to as bimodal rainfall distribution, north of the latitude has only one peak duration referred to as uni-modal rainfall distribution pattern (Table 2). This pattern of rainfall especially in area where cereals are produced affect total production output as it disallows double cropping per rainy season.

Temperature / solar radiation

Ogunwale et al. (1998) stated that water, solar radiation and temperature determine crop species, type of cultivars and management method that are suitable for cereal production in any area. As a result of the high solar radiations in Savannah, air temperatures are generally uniformly high with a slight drop in December and January (Ogunwole and Owonubi, 1998). Temperature affects cereal production by controlling the rate of physio-chemical reaction and that of evaporation of water from the crops and soil surfaces. Besides, temperature affects the rate at which the products of photosynthesis are used for growth respiration and accumulation of food reserves (Idem and Showemimo, 2004). A number of cereal crops

varieties require specific photoperiods for optimum yield. This is because they can change from vegetative growth to reproductive development only at a specific day lengths.

There are social adaptation options for responding to climate change and sea level rises in agriculture. Among these adaptation options are altered planting dates, changes to a crop more adaptable to the new climate, application of irrigation and changes in level of fertilizers.

Edaphic potential and constraints to the cereal production in Nigeria

The economic development of Africa, more than any other region, depends on development of the agricultural and agro-industry sectors, which are fundamentally affected by productivity and land resources; this is particularly true of Sub-Saharan Africa (Henao and Baa nante, 2006). By 2020, Africa is projected to import more than 60 million metric tonnes (t) of cereal yearly to meet its demand (Henao and Baa nante, 2006). Africa's food security situation has deteriorated significantly over the past two decades. Henao and Baanante (2006) also stated that Africa has population growth of 3% yearly and the numbers of malnourished people has grown from about 88 million in 1970 to more than 200 million in 1991 – 2001. African continent should address the issue of population growth serious by formulating policies and programmes like introduction of specific number of children (two) per family / woman as it's done in China. Any offender of this law must be punished.

Agricultural production in most of Africa is also hampered by the predominance of fragile ecosystems and low inherited soil fertility. The declining fertility of Africa soils because of soil nutrients mining is a major cause of decreased cereals crop yield and per capital food production in the mid to long term, a key source of land degradation and environmental damage. Population pressures now force farmers to grow crop after crop "mining" or depleting the soil of nutrient while giving nothing back to the soil.

The soil fertility of this region could be enhancing by avoidance of mono cropping, soil erosion, over grazing and bush burning and adoption of application of animal dung, crop rotation, fertilizer application and the use of green manure. The influence of nutrient mining on the land's capacity to sustain population and production has long-term impact besides of soil productivity and the consequent exodus of farmers.

According to Henao and Baanante (2006) about 33% of Sub-Saharan population is under-nourished compared with about 6% in North Africa and 15% in Asia. Most of the under-nourished populations are in East Africa, (10 - 50%) where soil mining rates are high. The nutrition level as measured in calories per person per day is lower than the basic level of 2,500 Kilocalories. Crop cereals provide more than 60% of these calories. Soils of the Nigerian Savannah, where the bulk of the cereals are produced, have low organic matter content as a result of high rate of chemical and biological actions as well as the abundance of micro organic activity.

Poor cereal crops varieties limit yield

Most of the Nigeria's cereals crop farmers still adopt the local varieties inherited from their great grand fathers. These local varieties have yield potential which contributes to low cereals production in Nigeria. To meet the 2020's food sufficiency in Africa, Nigeria must stand on her feet to encourage the use of improved varieties of cereals to its farmers as it accounts for 51% of total cereal production in the Sub-Saharan Africa (Table 1). In some cases these local varieties are photo-sensitive and take longer to time mature. Low yield levels have been experienced with local cultivar of sorghum, rice and other cereal crop (Idem and Showemimo, 2004). They also stated that local rice varieties only yield 1 - 2 tonnes per hectare while improve cultivar give yields of 2 - 4 tonnes per hectare depending on the ecology, crop and management practices adopted. Some of the improved varieties of the common cereal crops and their characteristics in Nigeria are given in Tables 3, 4, 5 and 6.

Weed constraints to cereals production in Nigeria

Weeds were reported by Akobundu (1987) as the most underestimated pests in tropical agriculture. Uncontrolled weed in cereal farms could lead to 100% yield drop, as weeds compete with plants for nutrients, space, light and even water. Striga (witch weed) is a parasitic weed that creates major problems across most of Africa and part of Asia and it is among the most important weed of the cereals in Nigeria.

It was reported by Saureborn, (1991) that about 21 million hectares of cereal in Africa are estimated to be infested by striga, leading to an estimated annual grain loss of 4.1 million tons in 1990. Striga cause a devastating impact on cereal crops such as maize, sorghum, millet and rice in Nigeria. It infests an estimated two thirds of the 73 million hectares devoted to cereal crop in Africa, resulting in crop losses of up to 70% among subsistence farmers (Ciotola et al., 1995).

Ciotola et al. (1995) stated that striga accounts for about 4.1 million tonnes losses in cereals yield each year and is considered by many experts to be the greatest obstacle to food production in Africa. Striga is one of the major reasons that the productivity of cereals like pearl millet has remained at subsistence levels for so many years (IAPPS, 2007).

Weeds also increase production costs in most cereal fields and crop yield are often reduced drastically as result of delayed weeding due to competition for labour at

Table 3. Improved varieties of sorghum.

Release Name	New name	Characteristics
KSV4 (BES)	SAMSORG-3	Short season type, maturity period 25 - 105 days semi-dwarf. Resistant/Tolerant to striga. Seed colour cream. Potential yield 1.5-2.5t/ha^{-1} yield
KSV 11	SAMSORG-5	Short season, maturity period 95 - 105 days. Tolerant to striga. Dwarf type, Seed colour white. Potential yield, 1.5-2.5t/ha^{-1}
ICSV 4000	SAMSORG-40	Short season. Maturity period 95 - 100 days. Semi-dwarf. Tolerant to striga. Potential yield 2.5 - 3.5t/ha^{-1} . Seed colour cream. Use for malt production and brewing.
NR71176	SAMSORG-38	Short season. Maturity period 95 - 105 days. Semi-dwarf. Potential yield 1.5 - 2.5t/ha^{-1} Seed colour cream
NR71182	SAMSORG-39	Short season. Maturity period 95 - 105 days. Semi-dwarf. Potential yield 1.5 - 2.5t/ha^{-1}.
KSV7	SAMSORG-13	Medium season. Maturity period 130 - 145 days. Semi-dwarf, slightly susceptible to striga. Potential yield 1.5 - 2.5t/ha^{-1}. Seed colour cream.
KSV8	SAMSORG-14	Medium season. Maturity period 130-140 days. Potential yield 2.5 - 3.0t/ha^{-1}. Seed colour white
SSV9 (L.243)	SAMSORG-23	Medium season. Maturity period 150-160 days. Tolerant to striga. Potential yield 2.5-3.5t/ha^{-1}. Seed colour cream.
SSV10(L.533)	SAMSORG-24	Medium season. Maturity period 150-160 days. Potential 2.5-3.51t/ha^{-1}. Tolerant to striga. Seed colour cream.
KSV3(SK5912)	SAMSORG-17	Long season, semi-tall. Tolerant to striga. Maturity period 165-175 days. Potential yield 25-3.5t/ha^{-1}. Seed colour yellow. For industrial use especially for brewing. Livestock, confectionery.
SSV2(FBL)	SAMSORG-16	Long season. Tall, fara fara, maturity period 165-175 days. Potential yield 2.5-3.5t/ha. Seed colour white. Use by industries especially for brewing.

Source: Cereal crops of Nigeria: Principle of production and utilization 2004.

the early stage of crop growth.

Market and trade conditions

Fluctuations in the price of cereals are seriously affecting its productivity in Nigeria. For instance, the demise of poultry and poultry processing companies following the outbreak of avian influenza in Nigeria has adversely affected the demand for maize across Nigeria. With last year's stock of grains still in the market, serious concern has been raised about the impact of the abundant supplies on grain prices with the exception of sorghum which is commonly demanded by breweries and other drink manufacturing companies in Southern Nigeria.

The poor demand for maize have discourage many farmer from maize production in 2006/2007 season, thus lowering production and consequently increasing the price in 2008.

Migration, ageing and HIV / AIDS

Migration is an age long phenomenon in which both young and old human populations move to new areas to grab better life. In recent times, migration of young and vibrant people to cities in search of greener pastures has had devastating effects on the labour force in cereal production in Nigeria. Many resource poor farmers depend entirely on family labour and it is their young and vibrant migrant group that constitute such labour. This is a disturbing and unpredictable phenomenon (FAFI, 2003). The provision of social amenities and employment opportunity in the rural areas will go a long way to solve the problem of migration among the youth. Nigeria government can also solve the problem by given credit facility and subsidise of Agriculture inputs to the young farmers in the rural areas.

Ageing has an adverse effect on cereal production in Nigeria and agricultural productivity in general. The aged, once in the bracket of active young men, have now receded to a weak group that need rest, respect and deference. Most of the people of over 55 years are unwilling or unable to work, especially when the farm is far from the house, or when working in low trend ecologies as in rice. The UN economic commission for Africa predicts that the size of the elderly population is expected to jump from 16.6 million to 28.6 million persons over the period from 1995 - 2015 (FAFI, 2003). HIV / AIDS has terrifying effects on agriculture particularly

Table 4. Improved varieties of maize.

Name	Maturity	Characteristics
TZL Comp 3	Full season	Resistance to foliar diseases but susceptible to *striga* and downy mildew
DMR-LSRW	Full season	Downy Mildew Resistance (DMR), strong roots, resistance to foliar diseases, good husk cover but susceptible to *striga* and storage insects
TZPB-SR	Full season	Strong roots, resistance to foliar diseases but susceptible to *striga* and downy mildew.
Swan-1 SR	Full season	DMR, resistance to foliar diseases but susceptible to *striga* and has mediocre husk cover
EV 8744-SR	Intermediate	Susceptible to *striga* and downy mildew
Obatanpa	Intermediate	Quality protein maize, susceptible to *striga* and downy mildew
EV 8766-SR	Intermediate	QPM Quality protein maize, susceptible to downy mildew and *striga*
DMR-ESRW	Early	DMR, resistance to foliar diseases, good husk cover but susceptible to *striga*.
TZE Comp 3	Early	Resistance to foliar diseases
EV 8731-SR	Early	Resistance to foliar diseases but susceptible to downy mildew and *striga*. Modest resistance to foliar diseases but susceptible to downy mildew and *striga*.
SAMMAZ 12 (TZEE-W-SR) TZESR-W x	Extra early	Modest resistance to foliar diseases but susceptible to downy mildew and *striga*.
Qua 31BCF6	Extra early	Modest resistance to foliar diseases but susceptible to downy mildew and *striga*.
b. Hybrid		
9021-18 SIR (Single cross)	Full season	Stable across ecologies, strong roots, clean ears / grain, oderate resistance to *striga* but susceptible to downy mildew.
8644-31 (Single cross)	Full season	Modest DMR but susceptible to *striga*.

Source: Cereal crops of Nigeria: Principle of production and utilization 2004.

cereal production in Nigeria. It is a sexually transmitted disease that challenges immune systems. The impact of HIV / AIDS is greatly felt in rural areas, since many infected urban dwellers and migrant labourers return to their villages to be cared for by their ageing parents and relatives.

The immediate impacts of HIV / AIDS are the loss of a productive person and time, as family members take time off from agricultural work to care for the sick. HIV / AIDS is spreading fast in Nigeria, despite government campaigns against it, there is still high prevalent in most areas known for cereal production, such as Benue, Zamfara, Kogi and FCT.

HIV / AIDS and its attendant erosion of human capital promises to worsen nutritional status and despite a decrease in prevalence of the disease since 2003, remains a significant threat to overall food security in a country where over 60 percent of the population depends on agriculture for their livelihood. HIV is prevalent and is currently 5 percent in Nigeria, down from 5.8% in 2003 (USAID, 2006).

Socio - economic considerations and government policies

Inconsistent government policies, devalued currencies and price instability hinder maximum returns to local cereal producers. These inconsistent policies have been counter productive. For example, rice imports have been banned by successive government in Nigeria to encourage local production, but importation is still going on. Presently, importation of rice is allowed at 100% tariff, thereby making foreign rice relatively expensive. Most recently the present government has announced 80 billion dollar rice importation not minding the effects of this on the local producers, if this colossal amount of money is used to empower our local farmers it will go a long way to improve cereal production in Nigeria. The government should formulate complementary cereals policies, particularly in the development of production infrastructure and input supply. Some of these policies that could assist in cereal production are permanent ban on rice importation, stability of cereal crop price,

Table 5. Descriptive features of some released commercial cultivars of millets in Nigeria.

Name	Plant height (cm)	Maturity period (days)	Morphological identifier	Adaptation	Yield potential kgha[1]	Major diseases	Outstanding characteristics
Ex. Bornu sammil-1	210-230	Early maturing 70-90	Cylindrical ear head 34-35cm in length	All Savannah zones	2000-3000	Resistant to major diseases	High yielding
Nigeria composit sammil-2	210-235	70-90	Spear shaped pointed ear head	All Savannah zones	2000-2500	Resistant to major diseases	Tolerates high degree of moisture stress: Wide adaptability
Dwarf composit sammil-3	110-130	Early maturing 70-90	Dwarf variety, medium sized ear head with compact grain, 35-45cm ear head length	Sudan Savannah and Sahel Savannah zones	1500-2000	Resistant to major diseases	Considered suitable for mechanization because of short stature
S.E. 13 sammil-6	210-235	Early maturing 65-85	Large ear head with small compact grains	All Savannah zones	2500-3000	Resistant to major diseases	High yielding; good tillering capacity
S.E. 2124 sammil -7	210-230	Early maturing 65-85	Cylindrical ear head, ear head length 30-40cm	All Savannah zones	2500-3000	Resistant to major diseases	Good seed quality; high yielding

Source: Cereal Crops of Nigeria: Principle of Production and Utilization (2004).

Table 6. Released varieties of sugarcane in Nigeria by NCRI Badeggi and their outstanding characteristics.

	Outstanding characteristics
NCS 001	High yielding, tolerant to smut, none flowering, high ratoonability
NCS 002	High yielding, early tillering, high ratoonability, drought resistant
NCS 003	High yielding, early maturing, ability to strive in poor soil, stem borer tolerant.
NCS 005	High yielding, early maturing, ability to suppress weed, high tillering, resistant to smut
NCS 006	High yielding, good ratoonability, high juice quality, high resistant to smut.
NCS 007	High yielding, high resistant to smut, high tillering ability, high juice quality
NCS 008	High yielding, heavy tillering, good ratoonability, early maturing.

NCS → National cereals sugarcane, Source: National cereals research institute Badeggi Bida, 2008.

consistent subsidy of agricultural inputs and provision of infrastructures like road and water to the farming communities.

It is argued that the over-dependence on oil has not allowed Nigeria to harness its potentials of agriculture. Informed players in the industry have stated that the Middle Belt of Nigeria alone can supply the rice requirement of the whole of West Africa if supported with good, consistent and lasting government policies favouring agriculture (FAFI, 2003). In Nigeria low yield of cereals is ascribed to increased cost of production, lack of fertilizers, non-maintenance of irrigation facilities and lack of labour (FAFI, 2003). Management practices such as weeding, transplanting and harvesting place heavy demands on family labour which is always limited. The farm level input use efficiency is generally low among resource poor farmers.

Development plans and annual budgets provided have funds for support to agriculture. These are however, hardly enough to support the sector. The available technologies are often poorly adapted to local biophysical and institutional conditions. The transfer of new cereal production to farmers is constrained by a range of problems in public extension agencies. In Nigeria the ratio of extension workers to farmers is very low, thereby reducing the participation of many farmers in technology transfer and the adoption process. The farmer's perception of new technologies is vital for their successful adoption (FAFI, 2003). It is necessary to identify the key characteristics of each technology and the challenges it can target for improvement. It is the extension worker that will make this possible. For example, consumers in Nigeria are ready to pay for high quality rice and yet there is no mechanism in place to improve the quality of local rice,

Table 7. Common pests of maize, symptoms and their controls measures.

Pest	Symptoms	Control
Termites	Feeding causes weakening of the base leads to lodging. Damage to vascular tissue causes wilting especially under water stress	1. Avoid continuous of the plant and cultivation of maize on the same piece of land. 2. Persistent insecticides such as gamma HCH or Carbofuran can be applied as soil treatment or to the mounds to control colonies
Stem borer	Larvae bore directly into the stem. Plants attacked early in their life cycle may collapse and die. Large plants may continue to grow but fail to set seeds. Effects are severe on late planted crops.	1. Partial burning of harvested stalk kills the diapausing larvae. Also complete destruction of dry stalks and stubble is effective in killing the larvae. 2. Deep ploughing after harvest 3. Treatment with carbary (1.5kga.i.ha^{-1}) applied twice at 2-3 weeks interval or carbofuran granule (3%a.i.ha^{-1}) at planting is also effective. 4. Early planting
Earborers	Larvae attack the cobs feeding on the grains usually at the silk channels. Also larvae may occasionally feed on the leaf whorls.	1. Do not grow maize with other cereals or coton together on the same field 2. Apply contact insecticides such as endosulfan or synthetic pyrethroids 3. Use of resistant varieties
Maize weevils	Circular exit holes on the surface of the grain	1. Proper drying of grains before bagging and storage 2. Fumigation of grains with phostoxin tablets
Rodents	Feeding and digging of sown seeds and destruction of seedlings. Damage of stored produce due to contamination and spoilage through urination and defecation	1. Use of anticoagulant rodenticides bait such as warforin, coumateralyl.

most millers are not even aware of this issue. There is need for all organs of the government both local and federal level to support and empower agricultural extension workers in order to enhance the dissemination of new technologies to the producers.

Pest and diseases

Pest and diseases infestation seriously affect the cereals production in Nigeria. Some of the common pests of cereal in Nigeria are locust, termite, bird and mammals like rat while diseases include smut, blight and root rot to mention but a few. Idem and Showemimo (2004), reported that downy mildew (*peronosclerospora sorghi*) is a serious disease of maize in Nigeria which cause yield loss of up to 80% depending on the variety while bacterial diseases (*Xanthomonas* spp) could cause up to 10 - 30% yield loss in rice. Effective management of pest and diseases in Nigeria will definitely improve cereals production in Nigeria and common pests and diseases of cereals and their control measures are highlighted in Tables 7 and 8. Smut is panicle disease (its attacks the flowering head) of cereal crops like pearl millet, sorghum and sugar cane. The primary source of inoculation is spore balls in the soil from previously infested crop residues and surface contaminated seeds used for sowing (Thakur and King, 1988). Rust is foliar disease of cereal crops. The occurrence of the disease during seedling stage can result in substantial losses in grain and fodder yield and qualities (Craufurd and Revelo, 1988).

OTHER FACTORS LIMITING THE PRODUCTION OF CEREALS IN NIGERIA

Illiteracy

Majority of Nigeria's farmers cannot read and write which impede their ability to adopt new technologies that could enhance production of cereal crops in Nigeria. Making basic education free and compulsory all Nigerian children will go along way in solving this problem. Many state governments like Niger state have taken a bold step in this direction.

Tools

Farm operations from land clearing to crop harvesting and processing are carried out by hand using simple tools such as hoe, cutlass, axe, sickle and other local farm implements by the majority of Nigeria farmers. To enhance cereal production in Nigeria, modern farm implements such as tractor should be used to reduce

Table 8. Common diseases of maize, symptoms and their controls measures.

Diseases	Symptoms	Control
Seedling disease	Poor germination, blighting and diseases rattening and death of young seedlings, resulting in poor stand count	Seed dressing with contact and systemic fungicides, such as Apron plus and Apron star and Dithane M45
maize streak virus	Continuous whitish stripes on the leaves, chlorotic streaking over and along the vein of the leaf	Use of resistant varieties. Early planting. Insecticidal control of the insect vector. Intercropping with other cereal crops e.g. sorghum
Blight	Longitudinal necrosis and/or roundish or rectangular spots on the leaves	Avoid repeated planting of maize on the same plot to avoid inoculum buip-up. Seed dressing, Use resistant varieties, Burning of crop residues
Downy mildew	Whitish yellow discolouration (chlorosis) starting from leaf base, whitish conidiophores and conidia production on the lower leaf surface. Narrow and stiff leaves, leaf proliferation (crazy top), Plant stunting, Non-cob formation, Thin elongated plants resembling elephant grass	Plant healthy seeds, Plant resistant varieties, Treat with Apron plus (metalaxyl)
Rust	Bronish pustules on the leaf surface especially the under surface	Plant resistant varieties, Seed treatment control seed borne teliospores
Smut	Long smut galls in place of kernels. The galls are white containing black mass of sori (spores)	Seed treatments reduces soil and seed borne teliospores, Destruction of crop residue

Source: Cereal Crops of Nigeria: Principle of Production and Utilization (2004).

drudgery associated with simple farm tools and to increase size per farmer. Both state and federal government empower the farmers given them credit facilities and subsidising the modern Agricultural tools.

Finance

Most traditional farms have inadequate capital for the purchase of costly inputs such as farm machinery, fertilizer, herbicide and pesticide which contribute to low cereals production in Nigeria. Just as stated earlier, timely provision of fund to purchase the above inputs will definitely ameliorate this problem.

Cropping system

The term 'cropping system' is used to describe the pattern in which crops are grown in a given area over a period of time and includes the technical and managerial resources utilized (Onwueme and Sinha 1991). Most Nigeria farms practice mixed cropping which do not permit the use of modern implements and agro chemical like herbicides. In order to enhance productivity of cereal crops in Nigeria, effort should be made to encourage farmers to go into large scale sole cropping to enhance the use of agro-chemicals like herbicide.

Poor storage facilities

Often, Nigeria farmers are forced to sell their produce at cheaper prices during the harvest period because of lack of storage facilities than the appreciable prices during off season. Farmers do not seem to gain from the farming, as selling price is often lower than the production price and therefore may not encourage producing more on the subsequent season.

CONCLUSIONS

The savannah region of Nigeria holds the solution to improve sustainable cereals production and food security in Nigeria. This is because of the high isolation all year round and a favourable temperature condition. Efficient market information (MIS) system will also help traders to make storage decisions and move their produce profitably from surplus to deficit production areas. Thus, re-evaluation of the current MIS structure is recommended to increase cereal production in Nigeria. Building of additional storage facilities, at the Federal, State and Local levels to improve the country's storage capacity, may enhance the production of cereals in Nigeria. Effort should be made at Local and Federal levels to encourage the Nigerian farmers to make use of modern farm input and machinery to enhance cereals production and to encourage soil conservation methods.

Policy should be drawn to address standards of education for local farmers and to provide credit facilities to empower their ability of utilizing modern agro-chemical and machines. Solving Nigeria's cereal production problems is an indirect and powerful approach to alleviate poverty and improve the standard of living for Nigerian

farmers. It is also a direct way of improving GDP of the country. To reserve soil nutrients, mining policies and investment strategies must be designed and implemented at national levels focusing on well-defined target areas. Furthermore, it is evident that these measures must successfully promote the judicious use of mineral fertilizers in conjunction with sound soil conservation practices. Given the complex nature of the multiple constraints affecting the use of fertilizers, a well-integrated strategy involving the simultaneous implementation of all or some fertilizer use policies must be adopted to increase sustainable cereals production in the country.

In Nigeria, cereals are the only crops that are grown throughout the country in all the agro-ecology zones. Cereals are of the most widely grown crops in the world. Their ecological diversity and associated problems need systematic co-ordinated and collaborative research to find solutions to the problems posed. The solution to limited cereals production lies in supporting research and extension activities through adequate and timely funding. The government should be consistent in its agricultural policies such as provision of credit facilities, ban on importation of cereal crops and subsidizing agricultural inputs. Good seed is the most important input in crop production since its potential, determined by genetic make up, set upper limit of the yield attainable under the most conducive conditions. Government must make good seed available to farmers at subsidized rate through national seed service.

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