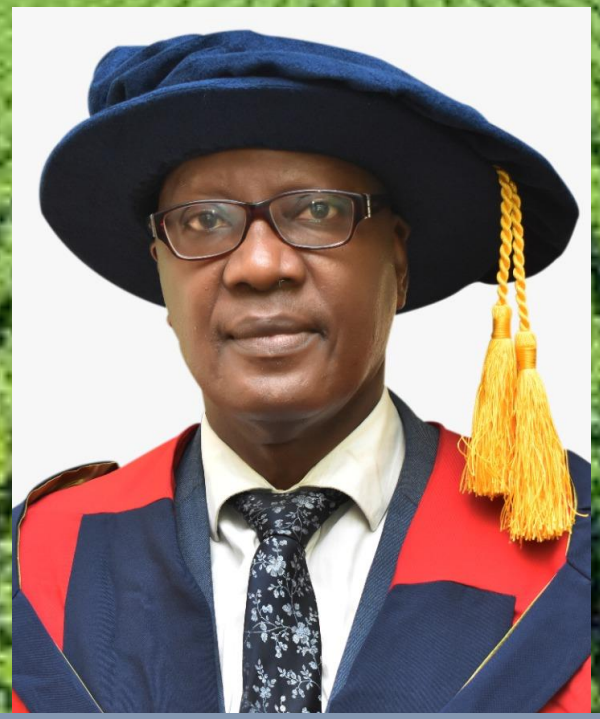
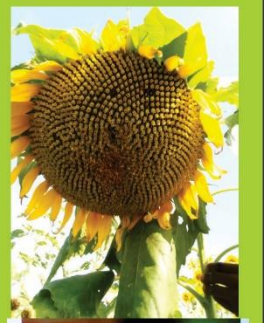
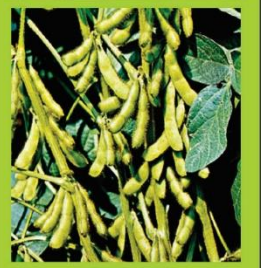
UNLOCKING THE PRODUCTION POTENTIALS OF SOME ANNUAL OILSEED CROPS IN NIGERIA



Professor Victor Idowu Olugbemiga Olowe
MSc. (Krasnodar), PhD (Ife)
Professor of Crop Production

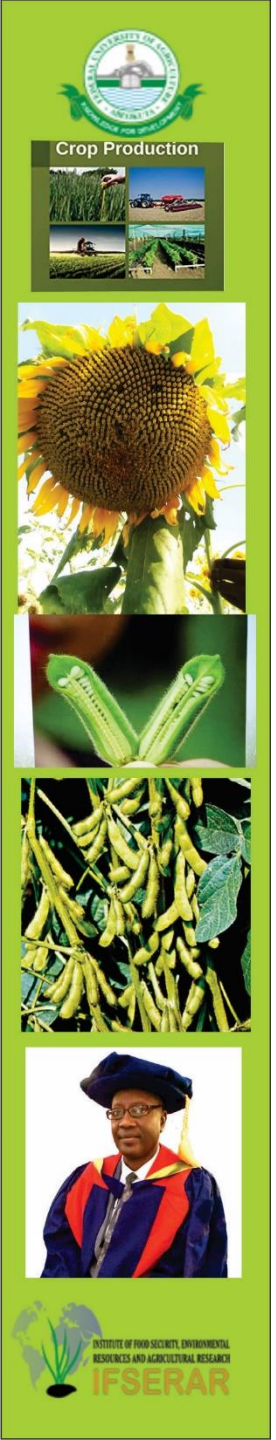
63rd Inaugural Lecture delivered at the Ceremonial Building, Federal University of Agriculture, Abeokuta, Nigeria on May 26, 2021





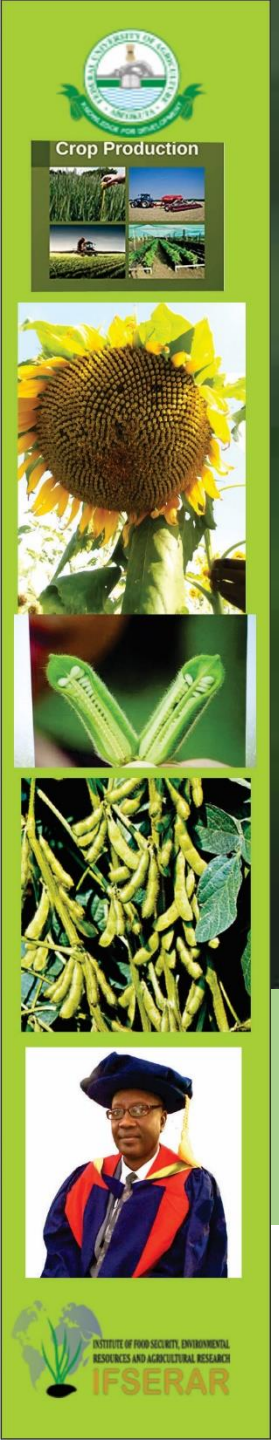

PROTOCOLS

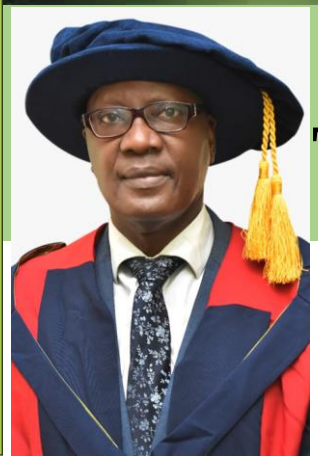
- The Vice Chancellor;
- Deputy Vice Chancellor (Academic);
- Deputy Vice Chancellor (Development);
- The Registrar;
- The Bursar;
- University Librarian;
- Dean, College of Plant Science and Crop Production (COLPLANT);
- Deans of other Colleges;
- Director, Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR);
- Directors of Centres and Services;
- Head, Department of Plant Physiology and Crop Production (PPCP);
- Heads of other Departments;
- Distinguished members of the University Senate;
- Distinguished Academic and Professional Colleagues in FUNAAB and from other Tertiary Institutions;
- Members of my immediate and extended families;
- Distinguished Ladies and Gentlemen;
- Gentlemen and Ladies of the Press;
- Great FUNAABITES!!!



PREAMBLES

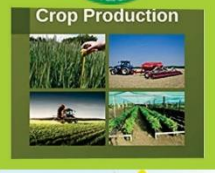
- 63rd Inaugural Lecture of FUNAAB Inaugural lecture Series
- 12th Inaugural Lecture from COLPLANT
- Third Inaugural Lecture from PPCP Department
- First Inaugural Lecture from IFSERAR

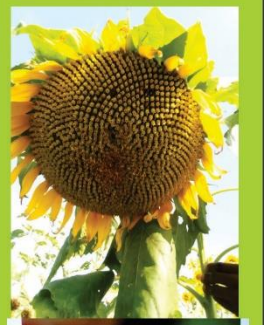




The title of this Inaugural Lecture is

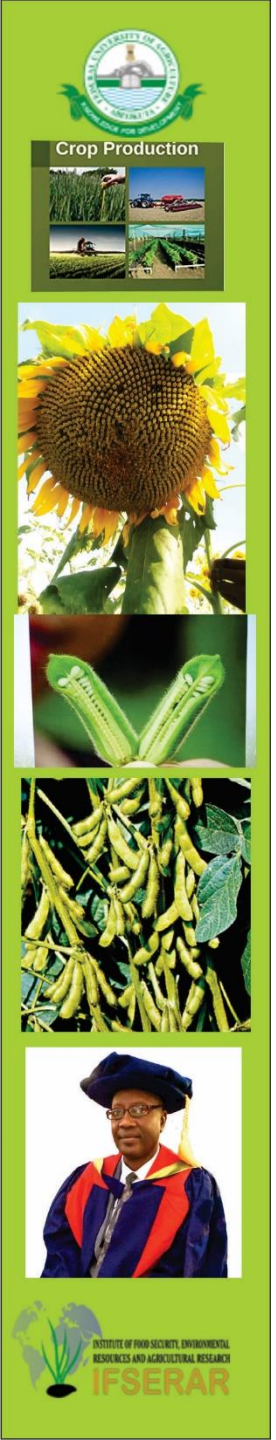
UNLOCKING THE PRODUCTION POTENTIALS OF SOME ANNUAL OILSEED CROPS IN NIGERIA





INTRODUCTION

- Nigeria is in west Africa
- Total area of 923,768 km^2. It shares borders with Benin, Niger, Chad, Cameroon and a coastline.
- Nigeria occupies 91M ha out of which 40M (45%) ha are used for cropland.
- Nigeria has two of the largest rivers in Africa (Rivers Niger and Benue).
- <1% of land is under irrigation in Nigeria.
- Population of > 193 million people.



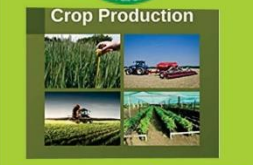
OIL SEEDS

- Oilseeds – crops that bear oil in their seeds.

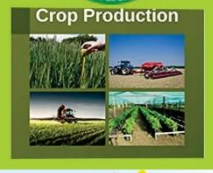
Examples of oilseeds in Nigeria are:

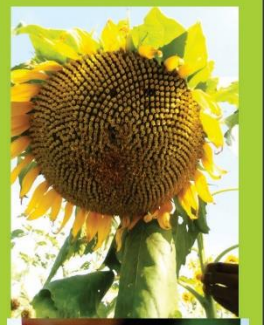
- Cashew (*Anacardium ocidentale* L.)
- Oil palm (*Elaeis guineensis* L.)
- Cottonseed (*Gosyppium* spp L.)
- Groundnut (*Arachis hypogea* L.)
- Sunflower (*Helianthus annuss* L.)
- Sesame seeds (*Sesamum indicum* L.)
- Soybeans (*Glycine max* (L.) Merrill)
- Maize (*Zea mays* L.)
- Castor seed (*Ricinus cumunis* L.) among others

EDIBLE VEGETABLE OIL

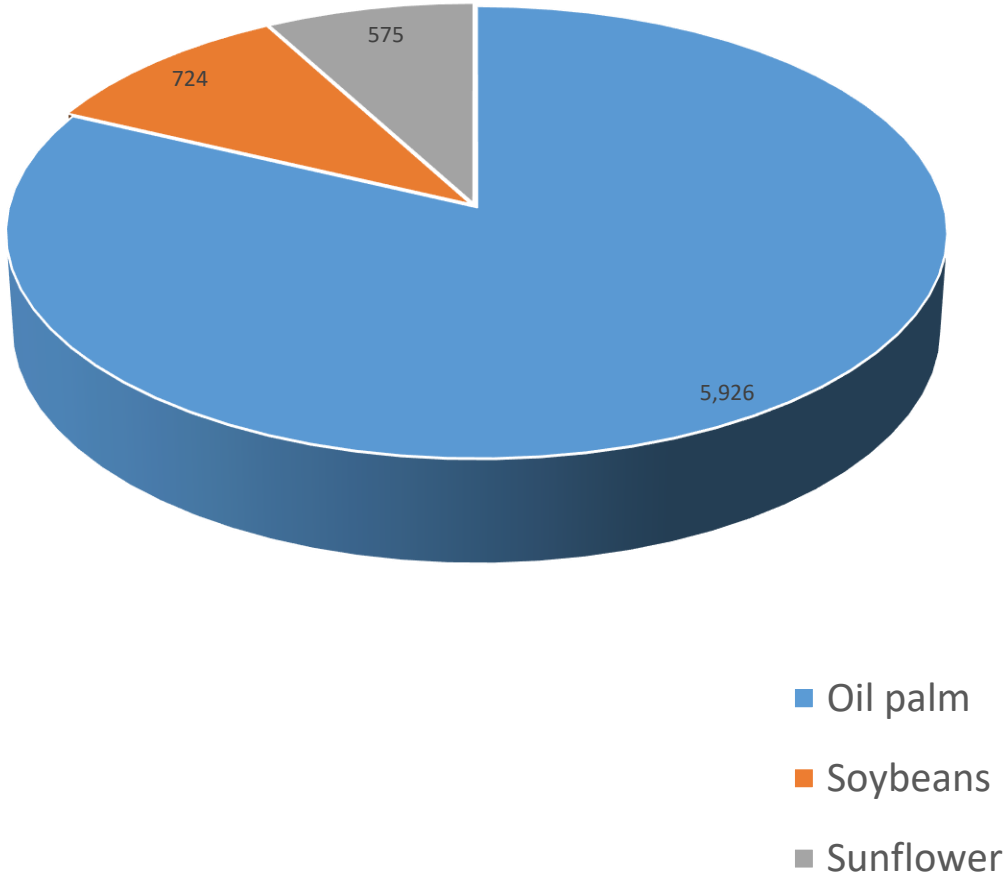


- National Consumption Requirement (NCR) of edible vegetable oil is about 3 million tonnes per annum.
- Shortfall of >600,000 tonnes met by importation
- Palm oil/palm kernel oil and soybean oil contribute approximately 70 % and 25 % of the country's NCR, respectively.
- The remaining 5 % is met by other oilseeds.

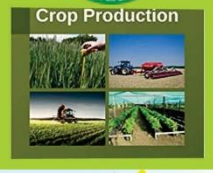


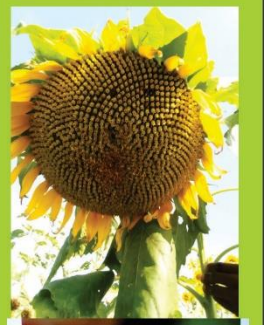


- According to the CBN Report, $500 million was spent on palm oil importation annually (Adesoji, 2019).
- In 2017, Nigeria spent a total of $1.46 billion on the importation of 11 vegetable oils with palm oil, soybeans and sunflower occupying the first three positions in terms of cost of import



Oil product importation (tonnes) in 2017





MY CONTRIBUTIONS TO OILSEED PRODUCTION RESEARCH

THREE CROPS OF FOCUS IN THIS LECTURE

SOYBEANS

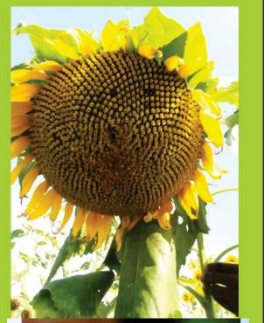
(*Glycine max* (L.) Merrill)

SESAME (*Sesamum indicum* L.)

SUNFLOWER (*Helianthus annuus* L.)

Minor oilseed/Orphan crops?????

Crop Production



SESAME (BENNISEED)

- Sesame (*Sesamum indicum* L.) (beniseed) is an oilseed crop with the appellation "Queen of oilseeds" because of its high quality oil (50-60% oil and 19-25% protein).

- Known as "Ridi" in the north
  "Eso" by the Nupes
  "Ishwa" by the Tivs
  "Igogo" by the Igalas
  "Ocha" by the Idomas
  "Isasa" by the Igbos
  "Ekuku" by the Yorubas

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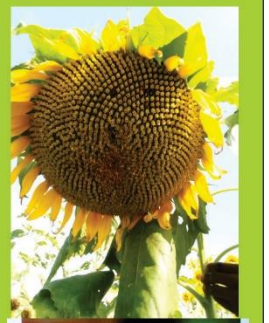
Crop Production



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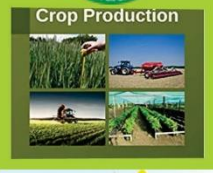
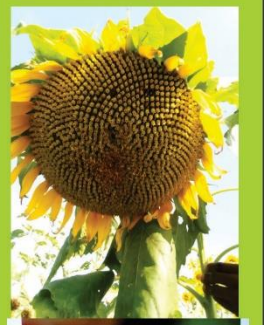
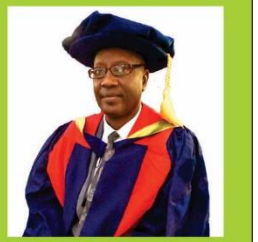
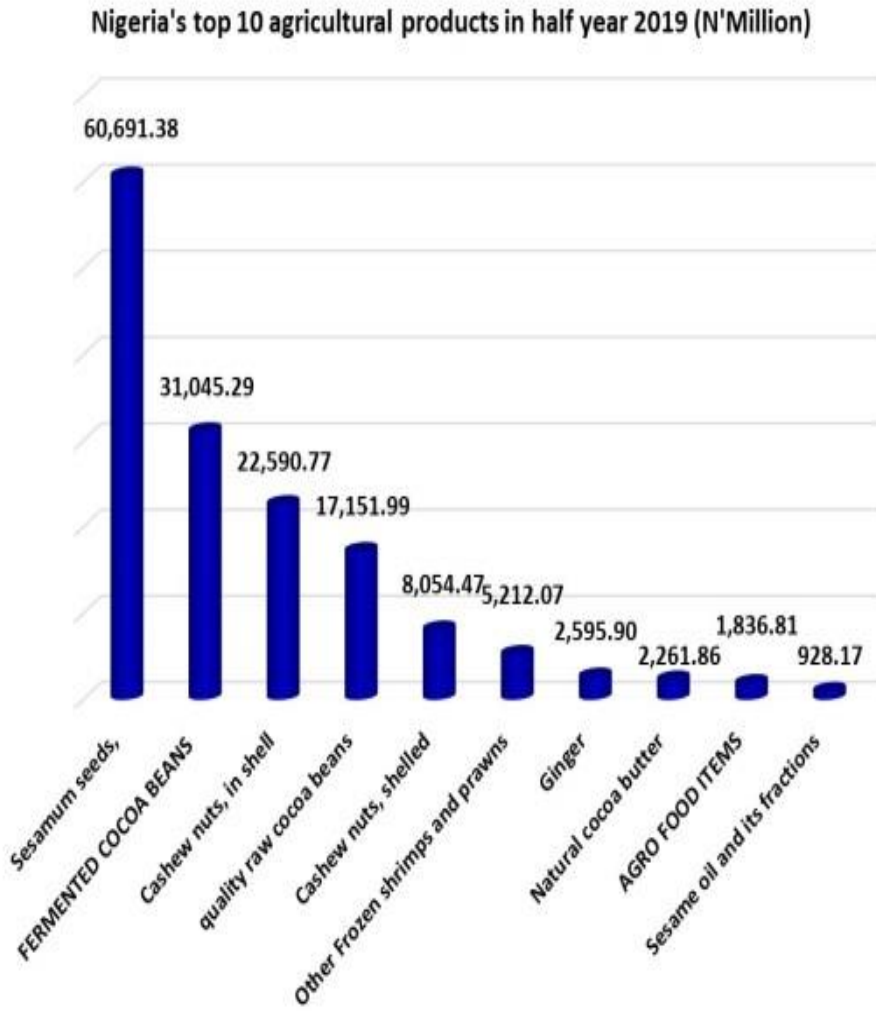
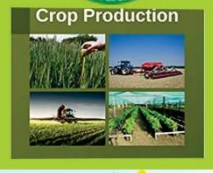


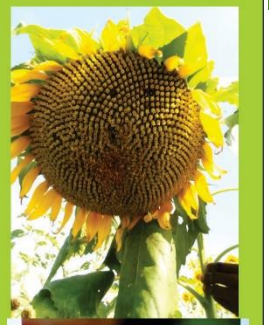




- Pioneer research efforts to improve the very low yield of sesame (300 kg/ha) commenced in 1964 at IAR, Zaria.
- Current yield is 1,062.5 kg/ha (FAOSTAT, 2019)
- Today, Nigeria is the 2nd largest producer in Africa after Tanzania and 4th after Myanmar, India and Tanzania in the world.



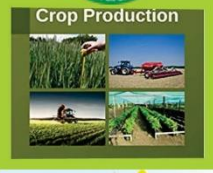


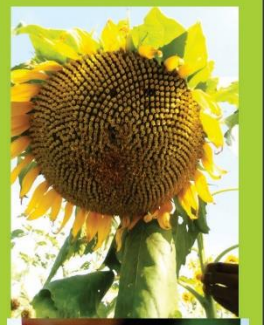


SOYBEAN

- Soybean seed contains **15-25% oil** and **40-50% protein**.
- Soybeans have historically been called

'Golden Bean',
'Chinese Pea',
'Cinderalla Crop',
'Meat of the field',
'Cow of China',
'Miracle Crop',
'Protein Hope of the Future',
'Life Giver',
'Meat without Bones' because of its colour and high protein content.





SUNFLOWER

Sunflower is grown mainly for its seed that contains oil (36–52%) and protein (28–32%).

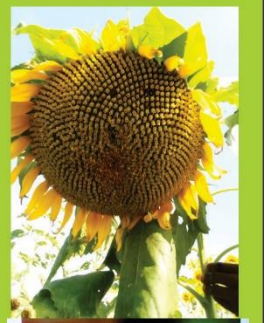
Sunflower seed is rich in Vitamin E that has anti-inflammatory and cardiovascular benefits.

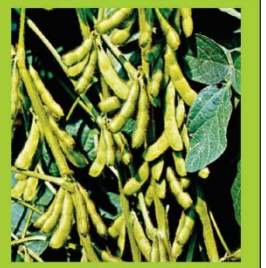
The seed also contains magnesium responsible for calming nerves, muscles and blood vessels.

Sunflower oil is used in industry for making paints and cosmetics.

VEGETATION BELTS IN NIGERIA

Crop Production





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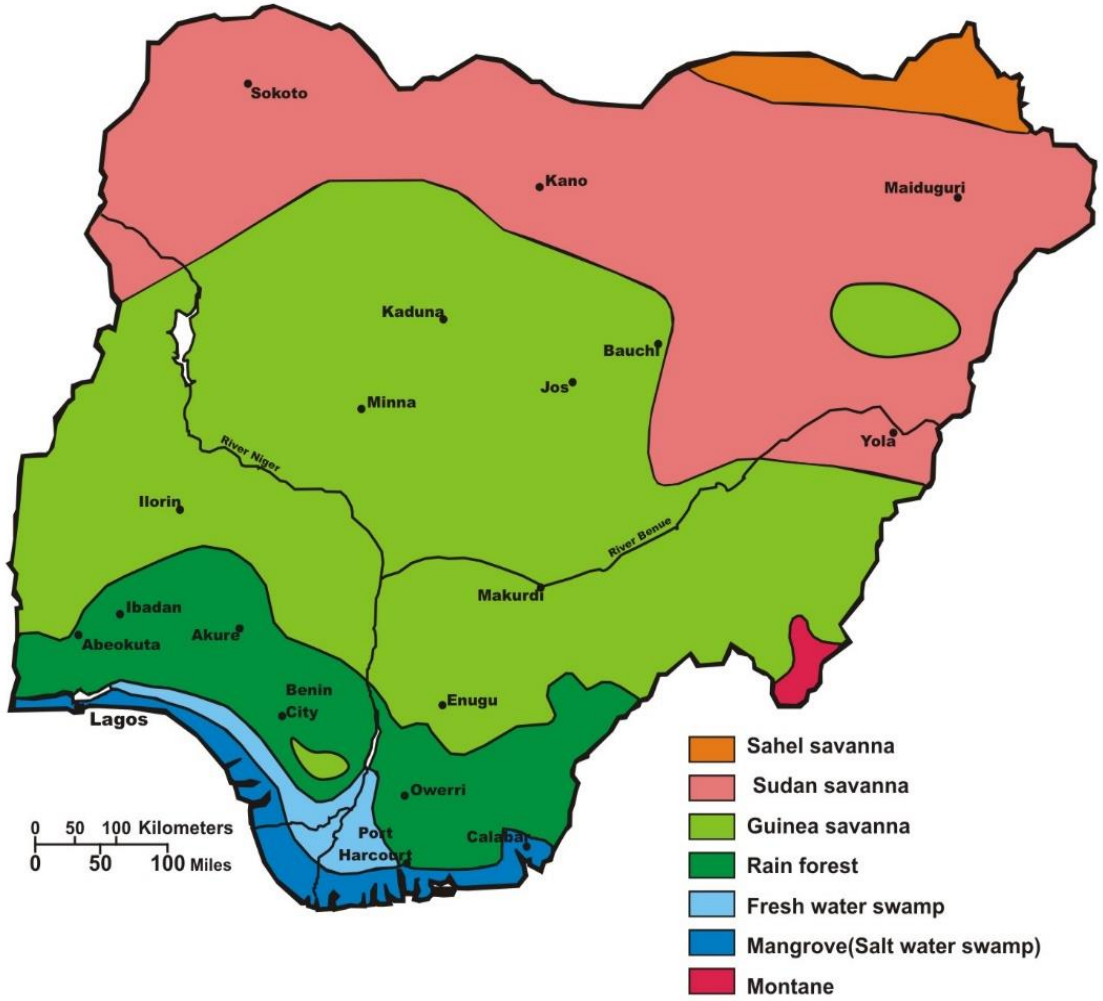
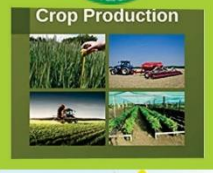
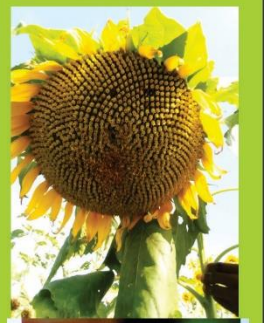
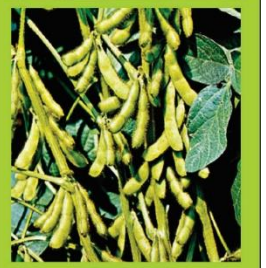
NIGERIA VEGETATION



Map Showing Major and Potential Producers of Sesame Seed in Nigeria Indicating the suitable states for seed multiplication and processing machine

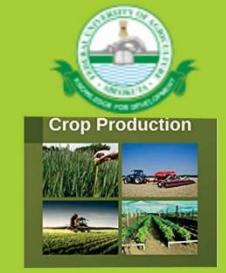


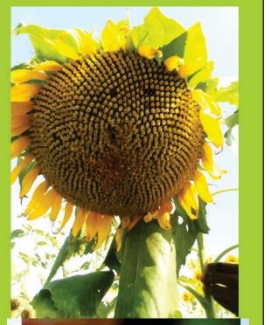




HYDROTHERMAL CONDITIONS IN FUNAAB BETWEEN 2000 AND 2019

- Nigerian agriculture is presently performing below its potential because it is mainly dependent on rain-fed cultivation.
- Only 1% of Nigeria's cropland are irrigated (Liangzhi et al., 2018).
- Rainfall is the most critical growth factor in Nigerian agriculture.
- Traditionally, the months of July and September are the two wettest months of the year (2001, 2007 and 2018).
- Sesame (500-650 mm), soybean and sunflower (500-750 mm) according to Weiss (2000).
- In a study conducted between 2001 and 2008, it was concluded that despite the global increase in climatic variability a good yield of sunflower is still possible in the humid tropical region (Olowe et al., 2014).





HYDROTHERMAL CONDITIONS IN FUNAAB BETWEEN 2000 AND 2019

The total rainfall values ranged between 641.7mm (2015) and 1212.4 mm (2010) as against 833.4mm for the LTM during the late cropping season.

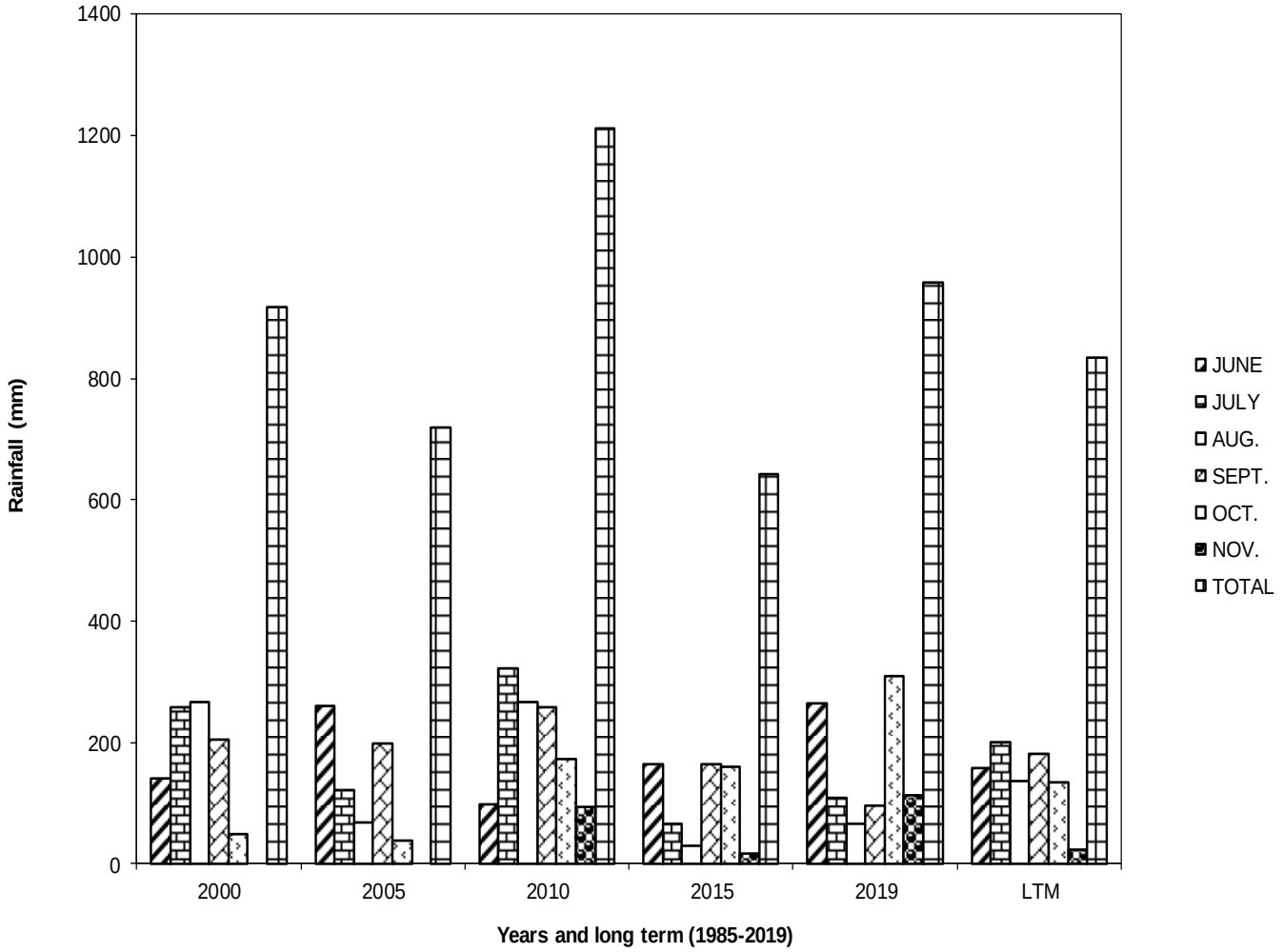
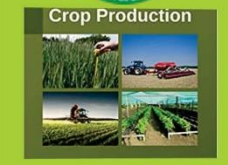
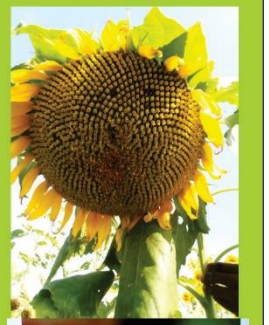


Fig. 1: Moving monthly rainfall distribution during the late cropping seasons of 2000 to 2019 and long term average (1985-2019)





SESAME PRODUCTION RESEARCH

- The first major challenge was getting the optimum output from a unit land area.
- Igbirra method (planting on widely spaced large ridges) and the Tiv method (seed broadcast on flat land or low and fairly wide ridges)
- Appropriate fertilizer regime to boost production.
- Optimum sowing date across agro-ecological zones.
- Appropriate threshing regime to reduce yield loss (5-10% Field Loss).
- Lack of adequate mechanized farming techniques.
- Very limited functional seed processing plants (three in the country).
- Integration of sesame into existing farming systems.
- Predominantly degraded soils with poor fertility status.
- Pests and diseases attack (20-25% Yield loss due to ALS and CLS).
- Limited number of National Research Institutes working on sesame

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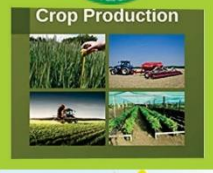

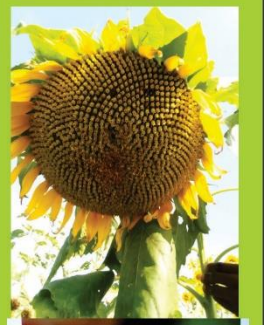

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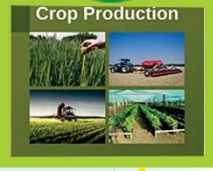
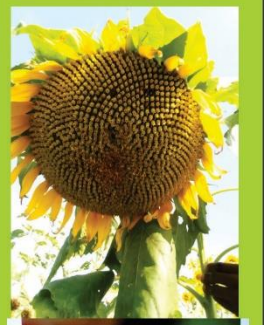
Table 1: Summary of research findings on sesame experiments

CONTRIBUTIONS	REFERENCE
Row spacing of 60 x 5-10 cm This recommendation had since been adopted by sesame farmers in Niger State, Nigeria.	Olowe and Busari, 1994
A combination of 60 kgN/ha and 30 kg P applied after first weeding at three weeks after sowing (WAS) was adequate for optimum productivity of sesame in the southern guinea savannah region.	Olowe and Busari, 2000
Significant yield loss was recorded when up to 66% and 99% of leaves were defoliated on sesame plant	Olowe *et al.*, 2004
Optimum sowing date within the forest-savanna transition zone is early – mid July	Olowe, 2007
Evaluation of seven sesame varieties revealed that their oil content (45-50%) and 1000 seed weight (2.5-3.4g) were within the international standards for premium price	Olowe and Adeniregun, 2010
Harvesting sesame plants at physiological maturity, staking to dry and threshing at 3 and 4 weeks after harvest	Olowe and Adeniregun, 2011





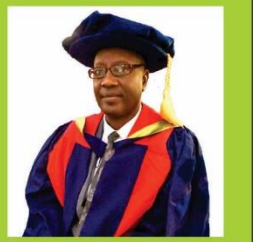


Table 2: Mean seed yield, 1000 seed weight, oil content and harvest index of seven sesame varieties, 2006

Variety	1000 Seed Weight (g)	Harvest index (%)	Oil content (%)	Seed yield (t/ha)
E-8	3.4	20,7	50.0	0.77
PBTil	3.0	25.2	45.0	1.05
NCRIBEN-01M	3.3	26.4	45.0	0.85
NCRIBEN-02M	3.0	26.4	45.0	0.92
NCRIBEN-03L	2.6	30.0	40.0	1.23
Yandev 55	2.5	29.1	40.0	1.11
Ex-Sudan	3.0	27.6	50.0	1.21
Lsd (5%)	0.31	0.43	2.38	ns

Source: Olowe and Adeniregun, 2010

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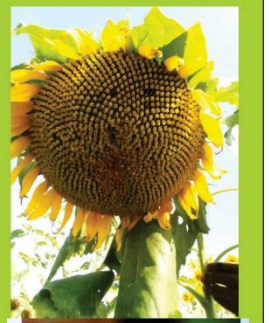
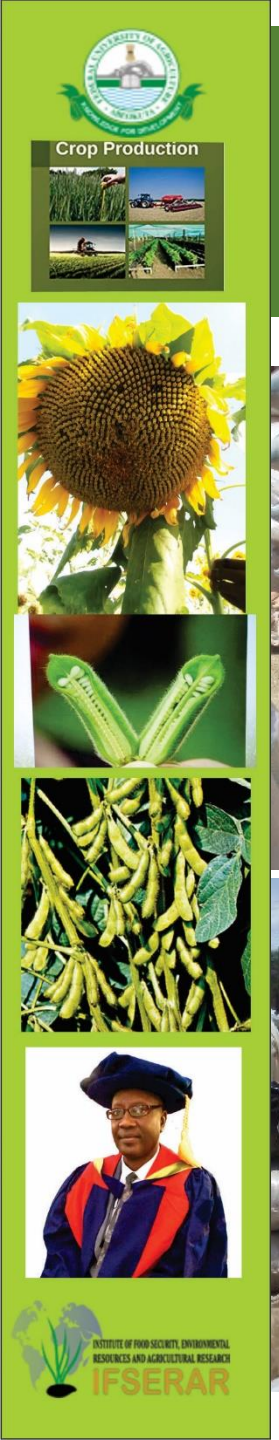



Table 3: Grain yield and 1000 seed weight of sesame var. E-8 subjected to different post harvest procedure

Treatment	Description	Grain yield (kg/ha)	1000 seed weight (g)
T1 (Control)	Plants threshed once at 1 WAH	261.0	2.8
T2	Plants threshed twice at 1 and 2 WAH	311.0	2.7
T3	Plants threshed twice at 1, 2 and 3 WAH	499.7	3.1
T4	Plants threshed twice at 3 and 4 WAH	861.3	3.3
T5	Plants threshed twice at 4 and 5 WAH	511.0	3.6
LSD (5%)		181.42	0.14

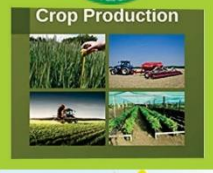
WAH – Weeks After Harvest

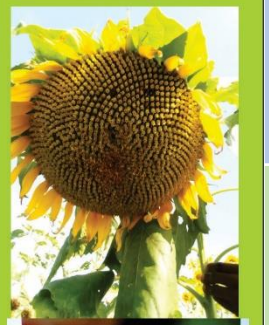
Source: Olowe and Adeniregun, 2011



SOYBEAN PRODUCTION RESEARCH

- Soybean is one of the world's most cultivated oilseed crops.
- Nigeria ranks 2nd after South Africa in Africa and 14th in the world.
- Soybean grain yield has been stagnant in Nigeria in the last five years.
- Soybean world average yield is 2791.4 kg/ha
- Soybean African average is 1379.0 kg/ha
- Soybean Nigerian average is 973.3 kg/ha (FAOSTAT, 2018)
- Some of the production constraints include sowing at suboptimal population, inappropriate fertilizer regime and post harvest handling methods.





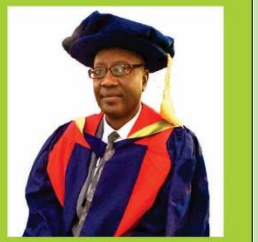


Table 4: Summary of research findings on soybean experiments

CONTRIBUTIONS	REFERENCES
Description of growth and development of newly released soybean varieties under varying row spacing in the forest ecology	Olowe and Alofe, 1991a & 1991b
The determinate types with shorter plant height were better adapted to the narrow (45 cm) - medium (60 cm) inter row spacing. Row spacing of 60 cm was recommended for soybean under sole and intercropping.	Olowe and Alofe, 1992
Two of the varieties (TGx 1448-2E and TGx 1440-1E) of soybean were identified among 16 entries based on their response to organic fertilizer application	Olowe and Onyenali, 2015
Application of organic fertilizers: Aleshinloye Grade B (abattoir waste-based), Organo Farm (brewery waste-based) and Gateway (animal dung and wood ash-based) significantly ($P < 0.05$: F test) increased agronomic performance of soybeans and oil and protein content relative to the control.	Onyenali et al., 2020

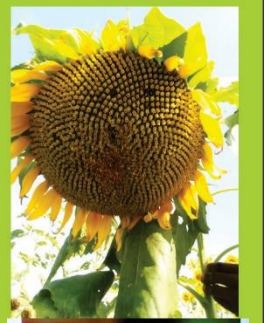



Table 5. Effect of organic fertilizer application on soybean seed yield and quality in 2015 and 2016

Treatment	2015			2016		
	Protein content (%)	oil	Seed yield (kg/ha)	Protein content (%)	oil	Seed yield (kg/ha)
Control	35.1	16.5	997.90	37.9	16.9	1444.45
Aleshinloye	36.9	17.6	1595.68	36.2	17.3	1577.78
Organo Farm	37.2	17.0	1446.57	35.6	17.1	1794.43
Gateway	37.4	17.6	1318.67	36.8	17.4	1683.33
LSD 5%	0.22	0.02	281.65	0.19	0.28	ns

Source: Onyenali *et al.*, 2020

SUNFLOWER PRODUCTION RESEARCH

- Sunflower is a relatively new crop in the forest – savanna transition of Nigeria.
- Its production is low and yet to be captured by FAOSTAT.
- Production constraints addressed included fertilizer requirements and regime, optimum plant population and agronomic performance in mixtures.

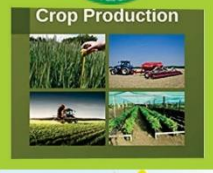


Table 6: Summary of research findings on sunflower experiments

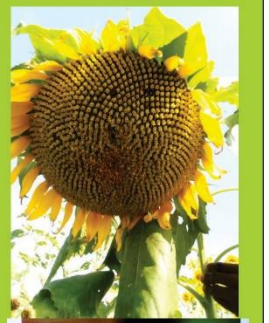
CONTRIBUTIONS	REFERENCE
Application of $N_{60}P_{30}$ was adequate for sunflower production in the forest-savannah transition zone of South West Nigeria	Olowe *et al.*, 2005a
Single application of both nutrients at 21 days after sowing (DAS) is appropriate for optimum productivity of sunflower in terms of seed quality (protein and oil content) and seed yield in the forest-savannah transition zone for local (Funtua) and two exotic (Record and Issanka) and four recently released sunflower varieties (SAMSUN 1, SAMSUN 2, SAMSUN 3 and SAMSUN 4).	Olowe *et al.*, 2005b; Akpojotor *et al.*, 2019
Sunflower demonstrated linear response to increase in plant population from 37,500 to 55,000 to 111,000 plants per hectare.	Olowe, 2005a
The performance of the three test varieties irrespective of their seed source was satisfactory because their seed yield values compared well with African and world averages.	Olowe *et al.*, 2013
Sunflower could be sown in the forest–savannah transition zone in early July to second and third week in August.	Oshundiya *et al.*, 2014




Table 7. Sunflower seed yield and quality as influenced by fertilizer regime in 2014 and 2015

Treatment	2014			2015		
	Protein content (%)	Oil	Seed yield (kg/ha)	Protein content (%)	Oil	Seed yield (kg/ha)
Control	15.3	27.2	1246.9	18.0	26.6	361.9
Split	21.1	27.8	1650.4	18.3	27.8	704.9
Single	16.7	28.4	1994.2	19.7	28.3	597.0
LSD (5%)	0.08	0.33	425.94	0.21	0.17	126.67

Source: Akpojotor *et al.*, 2019




SINGLE HEAD VS MULTIPLE HEADS

The fear of farmers that small seeds usually predominant on multiple heads can rarely produce the same crop as large seeds on single heads has finally been allayed (Olowe *et al.*, 2013).

VS

Table 8. Effects of plant population density on seed yield and some yield attributes of sunflower in 2002 and 2003

Treatment	2002			2003		
	Head wt. (g)	Achene number per head	Seed yield (t/ha)	Head wt. (g)	Achene number per head	Seed yield (t/ha)
Population/ha						
111,000	77.2	679.0	3.0	47.8	330	2.8
57,500	90.5	709.0	2.2	47.7	370	1.6
37,500	91.9	619.0	1.8	62.3	485	1.4
LSD (5%)	ns	ns	0.39	8.98	49.68	0.19

Source: Olowe, 2005a

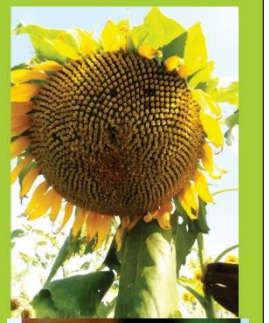
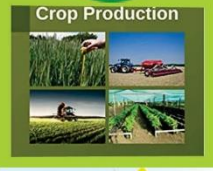
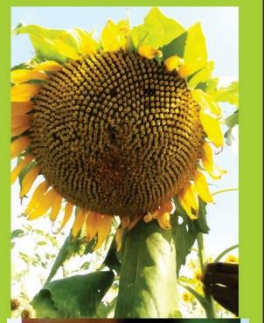



Table 9. Seed yield and oil content of three sunflower varieties grown from seeds of single and multiple headed plants

Variety	Seed source	Seed yield (kg/ha) 2004	Seed yield (kg/ha) 2005	Percent oil content (%) 2004
Record	Single	1201.0	1252.0	42.9
	Multiple	833.0	860.0	42.6
Issanka	Singe	1388.0	1202.0	48.3
	Multiple	1221.0	1036.0	49.4
Funtua	Single	1392.0	1019.0	45.7
	Multiple	1956.0	1499.0	44.5
SED(4d.f)		67.81	63.48	0.67
SED(10d.f)		98.88	91.10	1.14

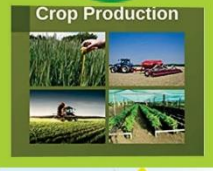
Source: Olowe *et al.*, 2013






MIXTURE PRODUCTIVITY STUDIES

After demonstrating the production potentials of these oilseeds under sole cropping in the forest-savannah transition zone which is outside their traditional growing areas, the next stage of our studies was to explore their potential in association with other crops (cassava, maize, cowpea etc) already established and adapted to the zone and also in mixtures involving other oilseeds.



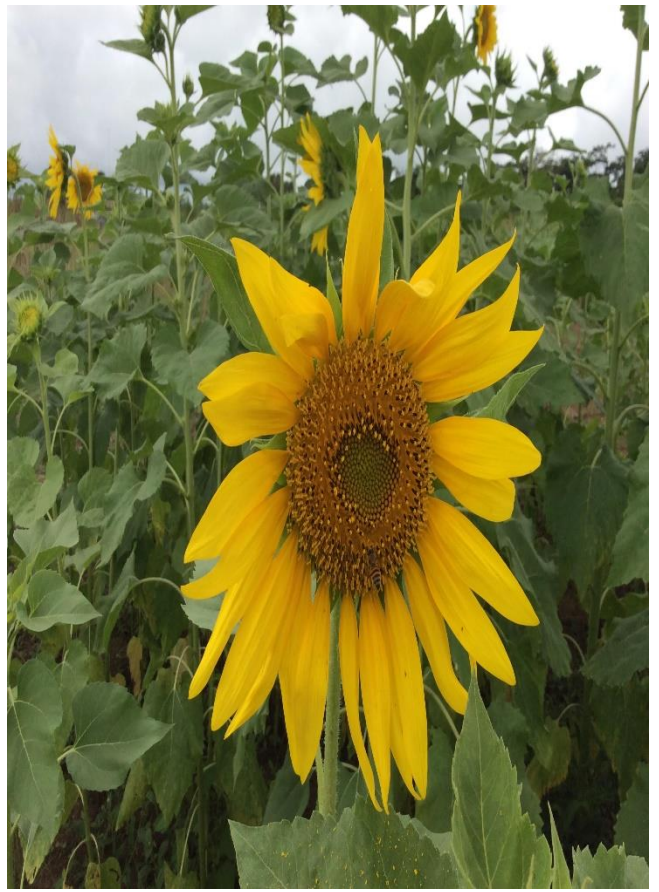
SESAME, SOYBEANS AND SUNFLOWER IN MIXTURES

SESAME

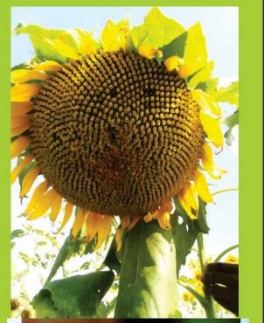
+

SOYBEAN

+



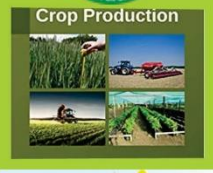
SUNFLOWER

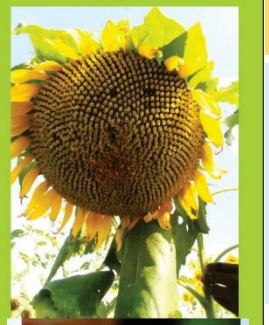



MIXTURE PRODUCTIVITY RESULTS

- Intercropping simply means growing two or more crops at the same time on a single field and it is an ancient practice still widely used in the developing countries of the world.
- Our studies evaluated competitive behavior and performance of component oilseed crops in different intercropping systems.
- Component crops exhibit contrasting growth habits

Sesame/Soybean intercropping at Ogbomoso, Oyo State





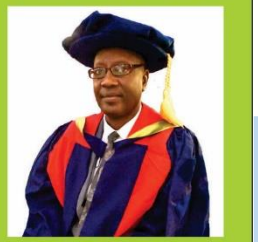
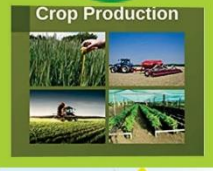


Table 9: Summary of research findings on mixture productivity experiments

CONTRIBUTIONS	REFERENCES
MAIZE + SESAME + SOYBEANS in 1998 and 1999 Maize + soybeans (100% population) and maize + sesame (75% population) recorded the highest values of Land Equivalent Ratio (LER), grain yield and maize equivalent yield.	Olowe *et al.*, 2003b
SESAME (3 Var.) + SUNFLOWER (3 Var.) in 2002 and 2003 It was concluded that growers can successfully cultivate the other two sesame varieties (530-6-1 and PBTil) along with E-8 under intercropping with sunflower in the humid forest–savannah transition zone. The mixtures of these varieties were very remunerative in terms of ROI in 2002 and 2003. Based on competitive ratio values, E8 demonstrated the greatest ability to compensate for intercrop competition with taller sunflower varieties in 2002 and 2003.	Olowe *et al*., 2005b Olowe, 2006 Olowe and Adeyemo, 2009
SOYBEAN + COWPEA + SUNFLOWER in 2002 and 2003 Intercropping of soybeans and cowpea with sunflower at V10 and simultaneously (SS) at planting resulted in the highest Monetary Equivalent Ratio (MER) and Sunflower Yield Equivalent (SYE).	Olowe *et al.*, 2006



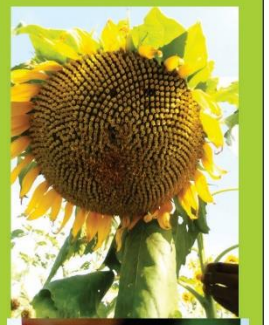
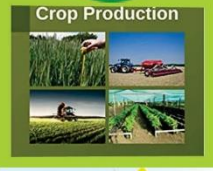


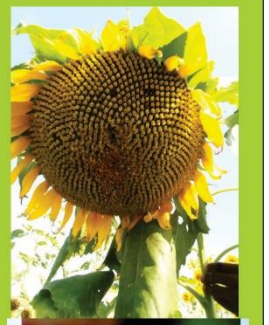

Table 10. Land Equivalent Ratio (LER) and Competitive Ratio (CR) of sesame/sunflower intercropping in 2002 and 2003

Intercropping System	2002			2003		
	LER	CR		LER	CR	
		Sesame	sunflower		sesame	sunflower
Sesame/sunflower						
E-8/Sunflower	1.37	0.56	0.40	1.13	1.53	0.18
530-6-1/Sunflower	1.46	0.43	0.55	1.32	0.79	0.31
PBTil/Sunflower	1.22	0.48	0.43	1.35	0.69	0.37
F ratio	2.73[b]	0.90[a]	1.11[a]	2.86[a]	18.36[b]	3.68[a]
SE± (16d.f.)	0.042	0.226	0.246	0.044	0.034	0.046

[a] - Significant at 1% probability level, [b] - Significant at 5% probability level

Source: Olowe and Adeyemo, 2009





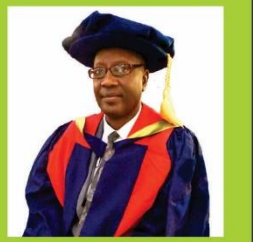
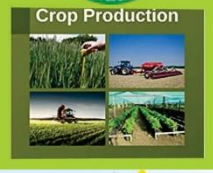



Table 11. Effect of intercropping on Land Equivalent Ratio and Grain yield of soybeans and sunflower varieties (mean of 2001 and 2002)

Intercrop	LER	Soybean grain yield (kg/ha)
TGx 1448-2E/Isaanka	1.47	1043.0
TGx 1448-2E/Record	1.04	565.0
TGx1448-2E/Funtua	1.13	630.0
TGx 1440-1E/Isaanka	0.95	665.0
TGx 1440-1E/Record	1.58	1081.0
TGx 1440-1E/Funtua	1.15	537.0
LSD 5%	0.05	335.40

Source: Olowe and Adebimpe, 2009



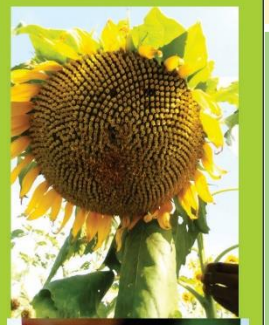
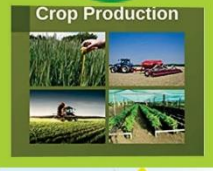
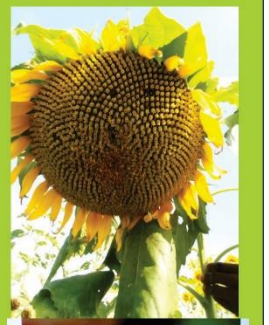
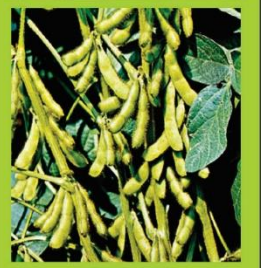


Table 12: Summary of research findings on mixture productivity experiments contd

CONTRIBUTIONS	REFERENCES
SUNFLOWER (3 Var.) + SOYBEANS (5 Var.) in 2001 & 2002 It was concluded that the combinations of TGx 1448-2E/Isaanka and TGx 1440-1E/Record be used to improve yields of vegetable oilseeds in Abeokuta. Key yield attributes like number and weight of seeds and pods per plant were positively related to grain yield of soybeans.	Olowe and Adebimpe, 2009
CASSAVA + SESAME + SUNFLOWER in 2003/2004 Based on MAI and CYE, TME 1/Ses/Sun, TMS 30572/Ses/Sun and TMS 30572/Sun were the three most economically efficient cropping systems, especially in the late planting season and were recommended to prospective growers for cultivation, economic empowerment, and reduction of household food insecurity	Adekunle *et al.*, 2014
SESAME (2 Var.) + SUNFLOWER in 2018 & 2019 It was concluded that the mixtures of both sesame varieties with sunflower introduced simultaneously and at 10 DAS with organic fertilizer applied are suitable for cultivation under humid tropical conditions. Organic fertilizer application also enhanced the yield attributes of both crops.	Somefun *et al.*, 2020







CROP ROTATION RESEARCH

Table 13: Summary of research findings on five year crop rotation trial

CONTRIBUTIONS	REFERENCES
SOYBEAN + SESAME + SUNFLOWER + MAIZE (2008 – 2012) **Our findings confirmed the huge potential of crop rotation in the management of soil fertility under organic production systems in the tropics because the grain yield values of soybeans (623.0 – 2758.3 kg ha-1) recorded compared favorably with the African (1,379 kg ha^{-1}) and world (2,854 kg ha^{-1}) averages (FAO, 2018)**	**Olowe and Adejuyigbe, 2020**

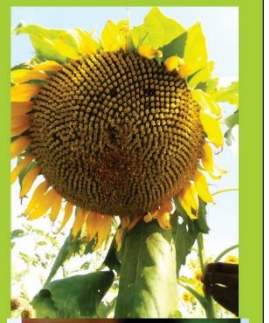
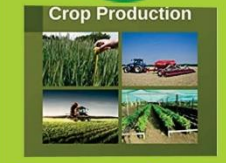
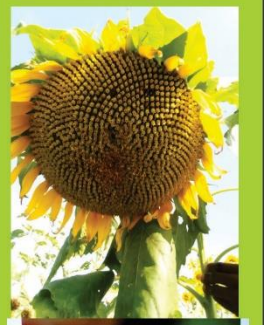


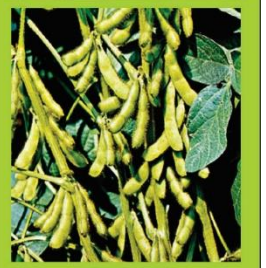
Table 14: Grain yield (2008 – 2012) and some yield attributes of soybeans (2012) under three cropping system

ropping System	Number per plant			Weight per plant (g)		Grain yield (kg.ha^{-1})					
	branches	seeds	pods	pods	seeds	2008	2009	2010	2011	2012	Mean
Continuous	2.9	156.8	78.5	21.3	11.8	1822.4	623.0	1343.8	1269.3	1893.3	1390.4
Rotational	4.9	317.3	132.8	34.0	19.5	1822.4	1029.0	2758.3	2445.0	2711.7	2153.3
Conventional	3.2	163.9	75.7	25.0	13.8	2004.0	1771.5	2556.3	1733.0	1913.2	1995.6
LSD (0.05)	0.59	74.03	22.16	ns	ns	ns	481.1	ns	415.60	556.12	511.79

ns – not significant







ORGANIC AGRICULTURE

Organic agriculture is a production system that sustains the health of soils, ecosystems and people.

It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects.

Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

International Federation of Organic Agriculture Movements (March 2005; ttps://www.ifoam.bio/en/organiclandmarks/definition-organic-agriculture)

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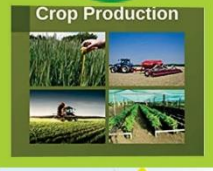
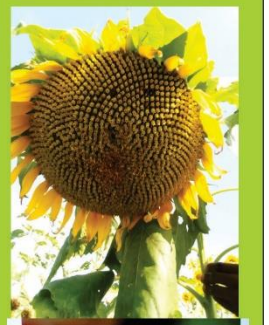




ORGANIC AGRICULTURE RESEARCH

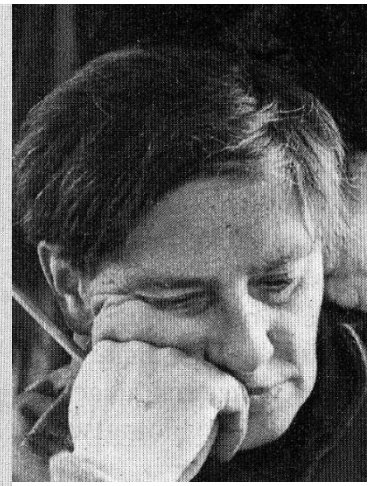
Table 15: Summary of research findings on organic agriculture experiments

CONTRIBUTIONS	REFERENCES
Identification of Skills Gap in some selected Higher Educational Institutions (HEIs) in Nigeria.	Aiyelaagbe *et al.*, 2016
Several of our studies on the development of appropriate agronomic practices for some oilseed crops under organic production system and how to use sustainable systems of cultivation have been highlighted in this lecture.	Olowe and Adebimpe, 2009; Olowe *et al.*, 2009; Adekunle *et al.*, 2014; Oshundiya *et al.*, 2014; Onyenali *et al.*, 2020; Olowe and Adejuyigbe, 2020; Olowe 2021.

Organic 1.0

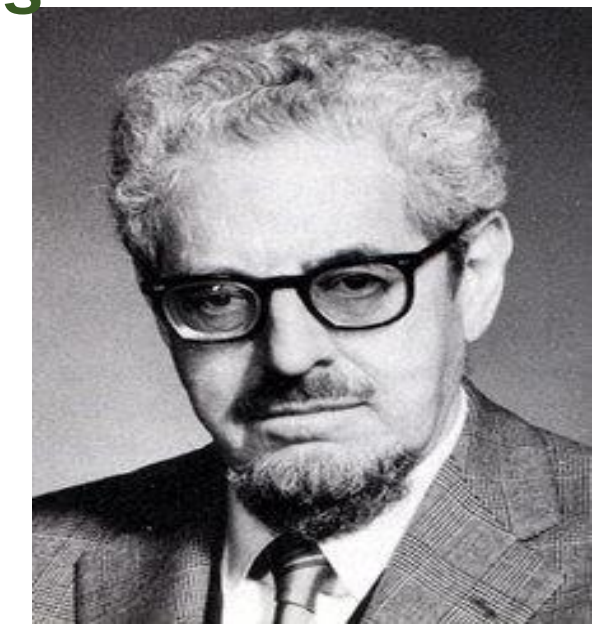
The first phase was initiated by pioneers

Sir Albert Howard



Lady Eve Balfour

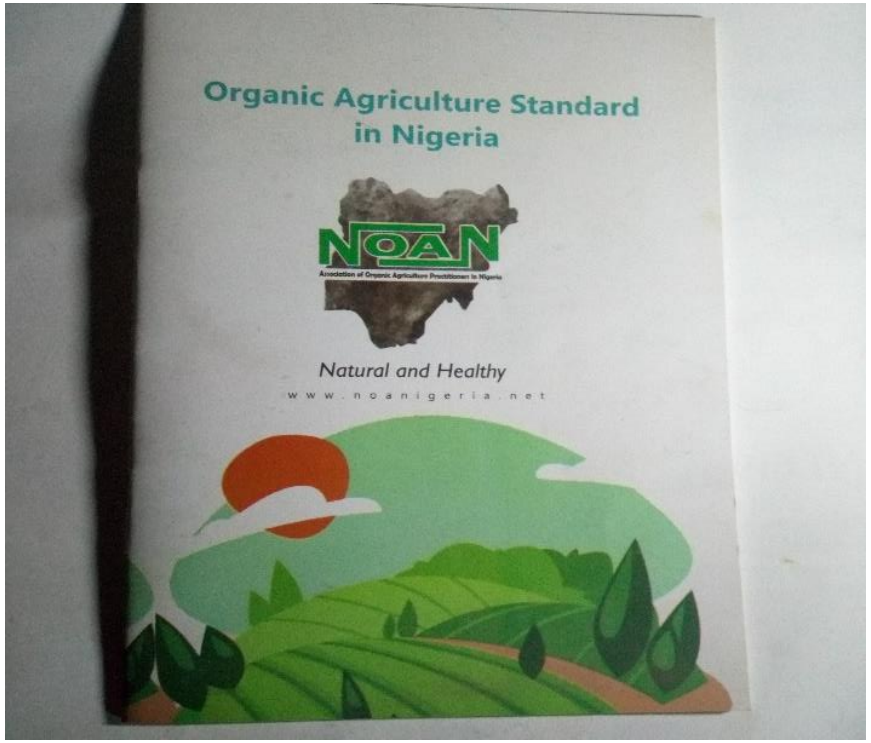
Rachel Carson



J I Rodale

Rudolf Steiner

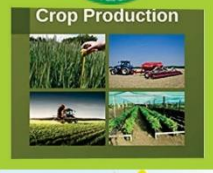
Organic 2.0

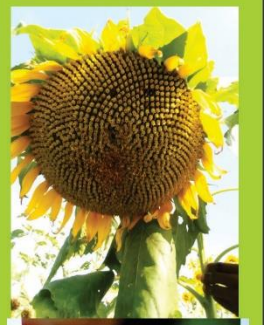


- **The second phase started in the 1970s and was defined by codifying organic agricultural systems**

- **The introduction of standards and 3rd party certification systems along with government regulations**

PROPONENTS OF ORGANIC 3.0

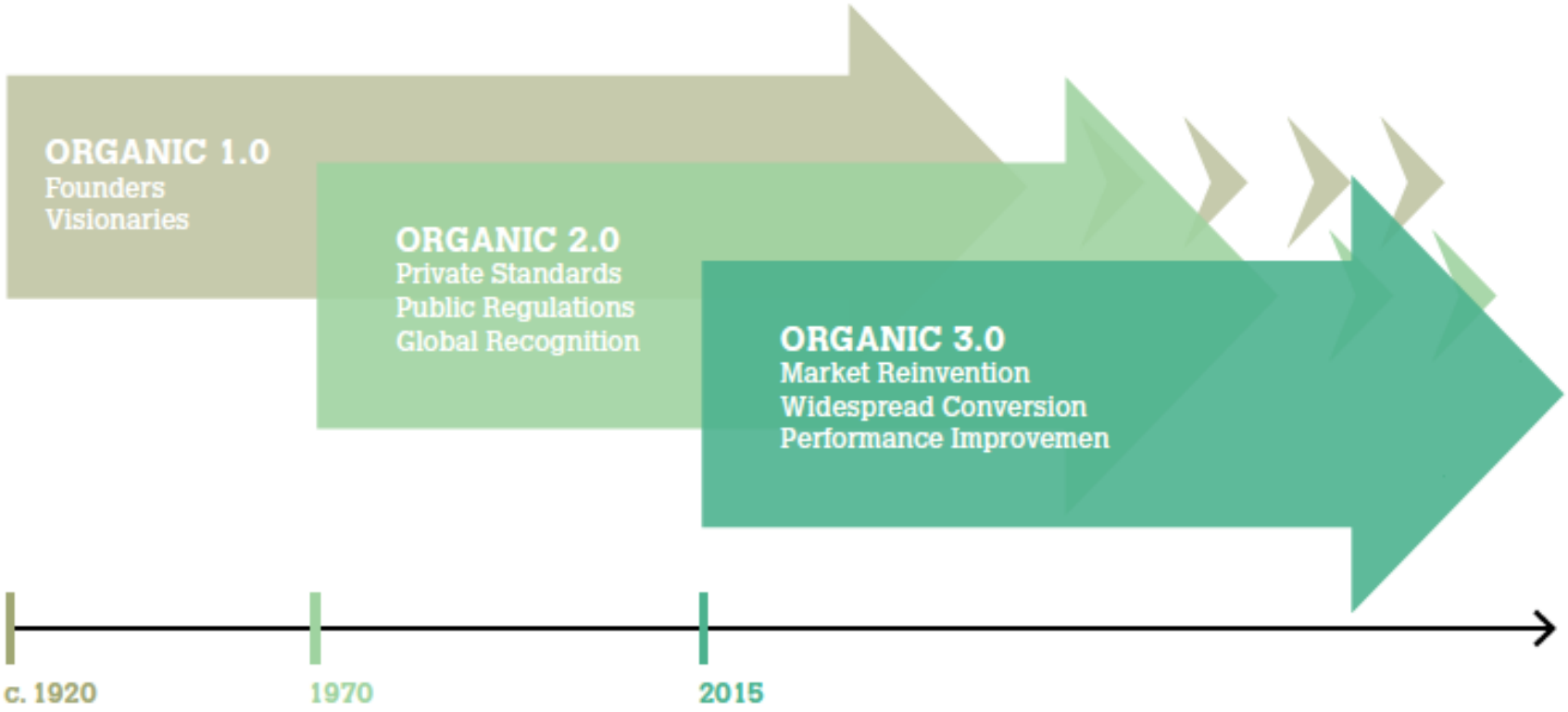


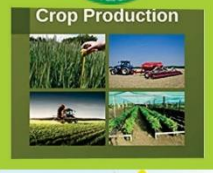


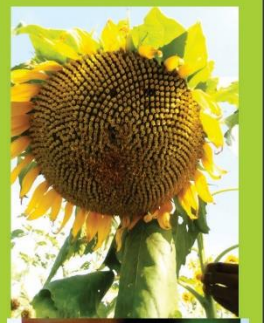
What is Organic 3.0?

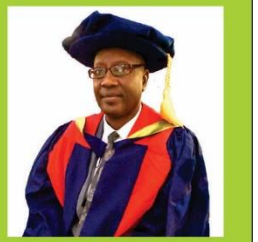
This is the third phase of the global organic movement

FIGURE 1 | Widespread Conversion Development Towards True Sustainability Inclusiveness



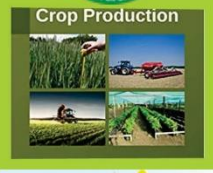


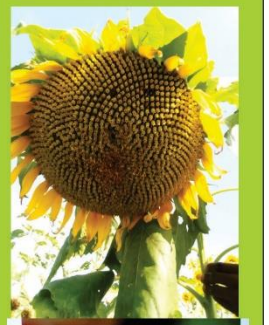


CONCLUSIONS

- Based on our findings on oilseed crop research in the last two to three decades, we have been able to demonstrate that soybeans, sesame and sunflower have huge agro-climatic production potential in the forest savanna transition ecology which is outside the savanna traditional growing region for the crops.
- The oilseeds produce very comparable and high quality grain yields when cultivated during the late cropping season

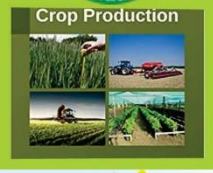


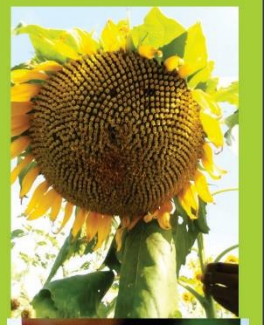


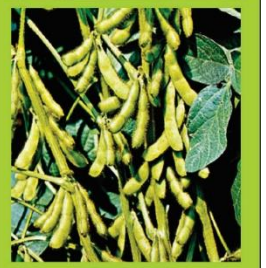
- We have developed appropriate agronomic practices such as optimum sowing date (Early to Mid July) and spacing (60 x 5 - 10cm) for sesame and soybeans, fertilizer regime (single application of 60 kgN/ha, 56kg P_2O_5 and 60kg K_2O/ha) and spacing (60 x 30cm) for sunflower.

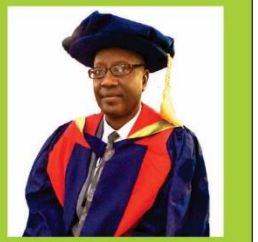
- We have also generated information on the efficacy of various locally produced and available organic amendments for enhancement of soil fertility and productivity of the crops in sole or compatible mixtures under organic production systems for soybeans, sesame and sunflower in this region.

- The current production levels of these minor oilseeds with huge production potential must be increased in order to drive the growth of the vegetable oil sector going forward.





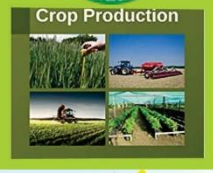


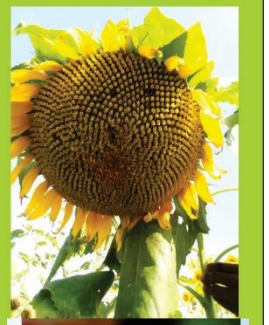


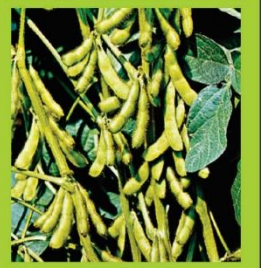
RECOMMENDATIONS

1. There is the urgent need to bridge the big gap between researchers and farmers if the developed technologies must get to the end-users. I recommend inclusion of farmers from the very beginning when a research topic is being conceived and planned for execution because the small to medium scale farmers produce about 90% of the food we consume in tropical Africa.

2. All the National Agricultural Research Institutes (NARIs) should be adequately funded to have a full complement of the value chains of their mandate crops. More funds should be allocated.



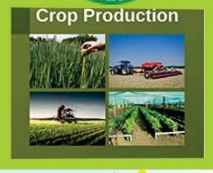


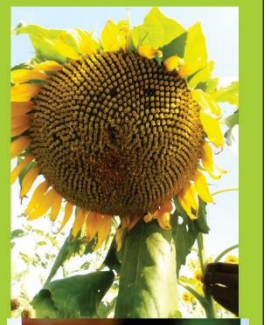


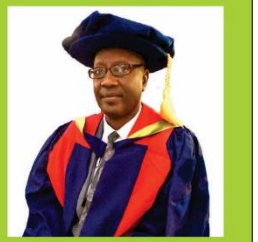
3. There is the need for massive investment in oil extraction and value addition technology in order to encourage production of the oilseeds with export potential.

4. Synergy between the NARIs and the Colleges/Faculties of Agriculture in the specialized and conventional universities should be strengthened.

5. Gainful employment of agriculture graduates by government and private bodies across the value chain will help drive the much-anticipated revolution in agriculture.



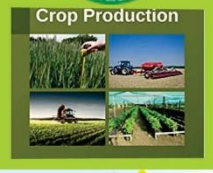


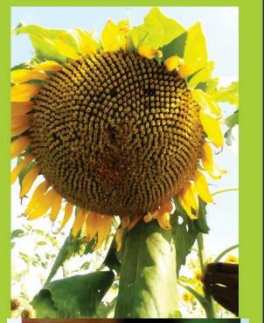


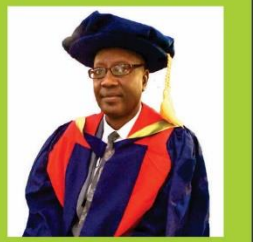
6. The various agencies saddled with the responsibilities to implement food and agricultural policies should be well-empowered and motivated.

7. If the well-articulated policies in agriculture must have any meaningful impact on the productivity of the agriculture sector of the economy, then the focus must shift a little from production to enhancing value addition across the facets of the value chain for all commodities.

SESAME SNACKS MADE FROM SEEDS AND LEAVES





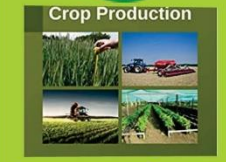



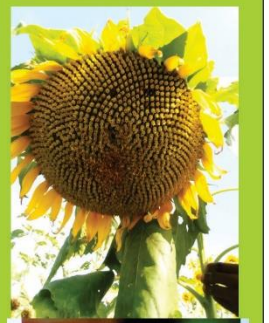
8. There should be a very strong synergy between policies, programmes, projects and frameworks at regional and national levels to enable all these strategies work.

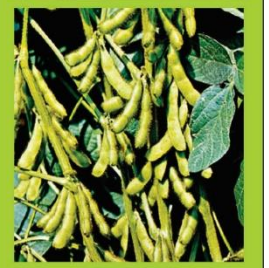
9. The society must reduce gender inequality and recognize the contribution of women (>80.0%) to agricultural food production.

10. Mechanization of the basic agronomic practices such as planting, tilling and harvesting of the oilseed crops should be pursued vigorously in order to reduce drudgery and improve technical competence of the workforce.

MECHANISED SESAME PRODUCTION

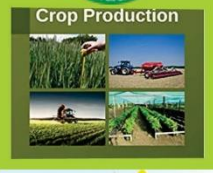


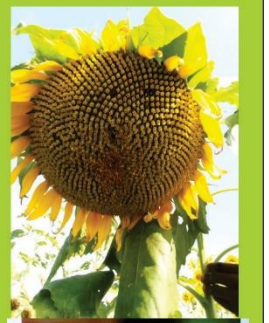


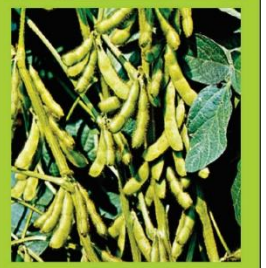


COMBINE HARVESTER

SEED PROCESSING MACHINE







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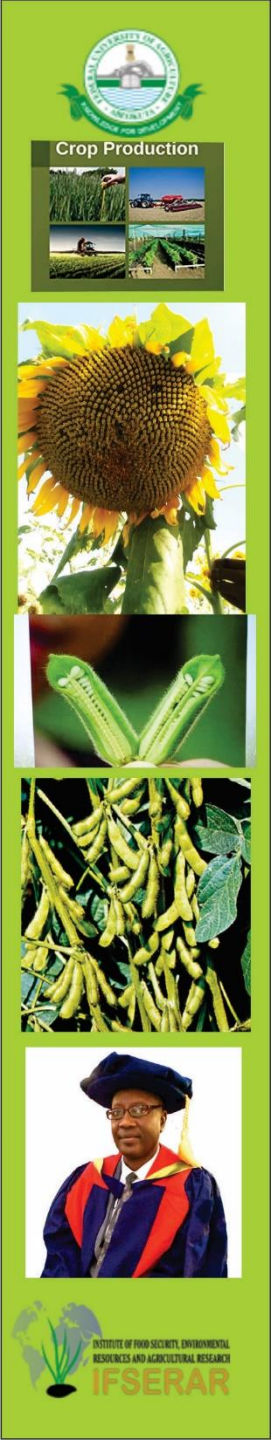
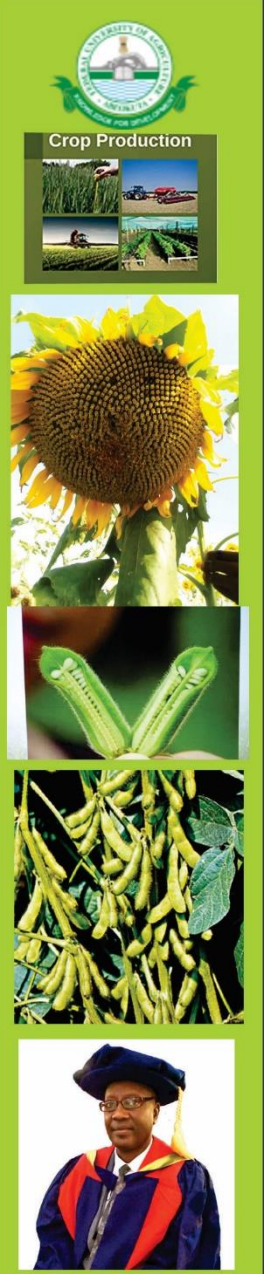
12. Training of the local farmers that produce about 80% of the oilseeds consumed in Nigeria is strongly advocated because these people are still using outdated manual harvesting techniques.

13. There is the need to invest massively in order to increase the total cropland under irrigation (presently 1%) and thereby transform the Nigerian economy from rain fed to grower led. Irrigation can provide the boost that the Nigerian economy needs to make the leap from rain-fed to grower-led.

14. Since organic agriculture is now recognized as the fastest growing sector of agriculture globally, Nigeria should take advantage of this opportunity by facilitating the mainstreaming of organic agriculture into the curricula of education at various relevant levels in the country.

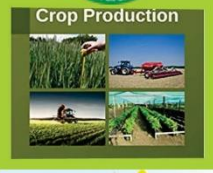


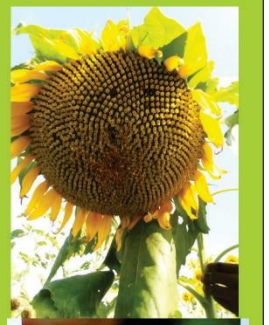
ACKNOWLEDGEMENTS

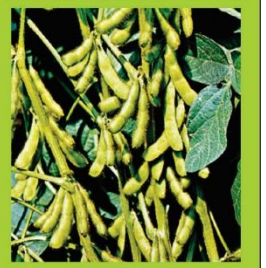


THE OLOWES

Deaconess G. O. Bajomo,
Deaconess V. O. Akindele,
Deaconess M. Hirse,
Deaconess B. T. Abudu,
Elder C. T. Olowe,
Mrs. G. K. Sehindemi
P/El. V.I Olowe and
Deaconess G. B. Laditan.







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DEPARTMENT OF IRRIGATION

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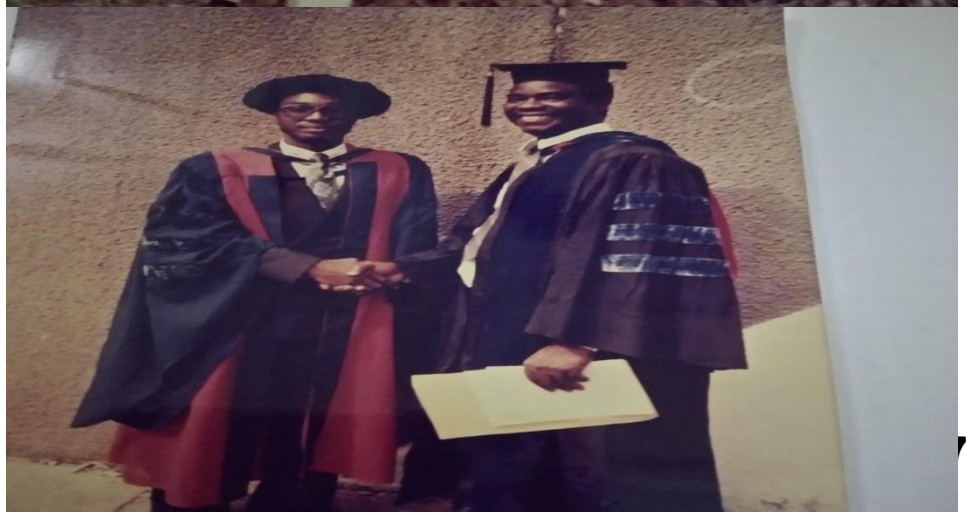
LATE PROF. CLEMENT OLUWOLE ALOFE

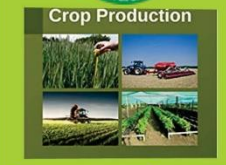
Ph.D PLANT SCIENCE (1989)

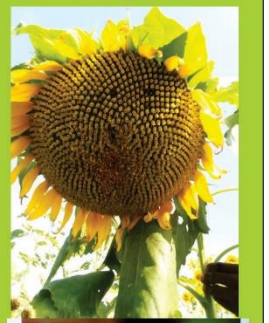
DEPARTMENT OF PLANT SCIENCE

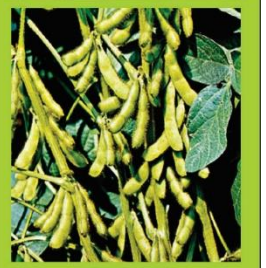
OBAFEMI AWOLOWO UNIVERSITY,

ILE IFE









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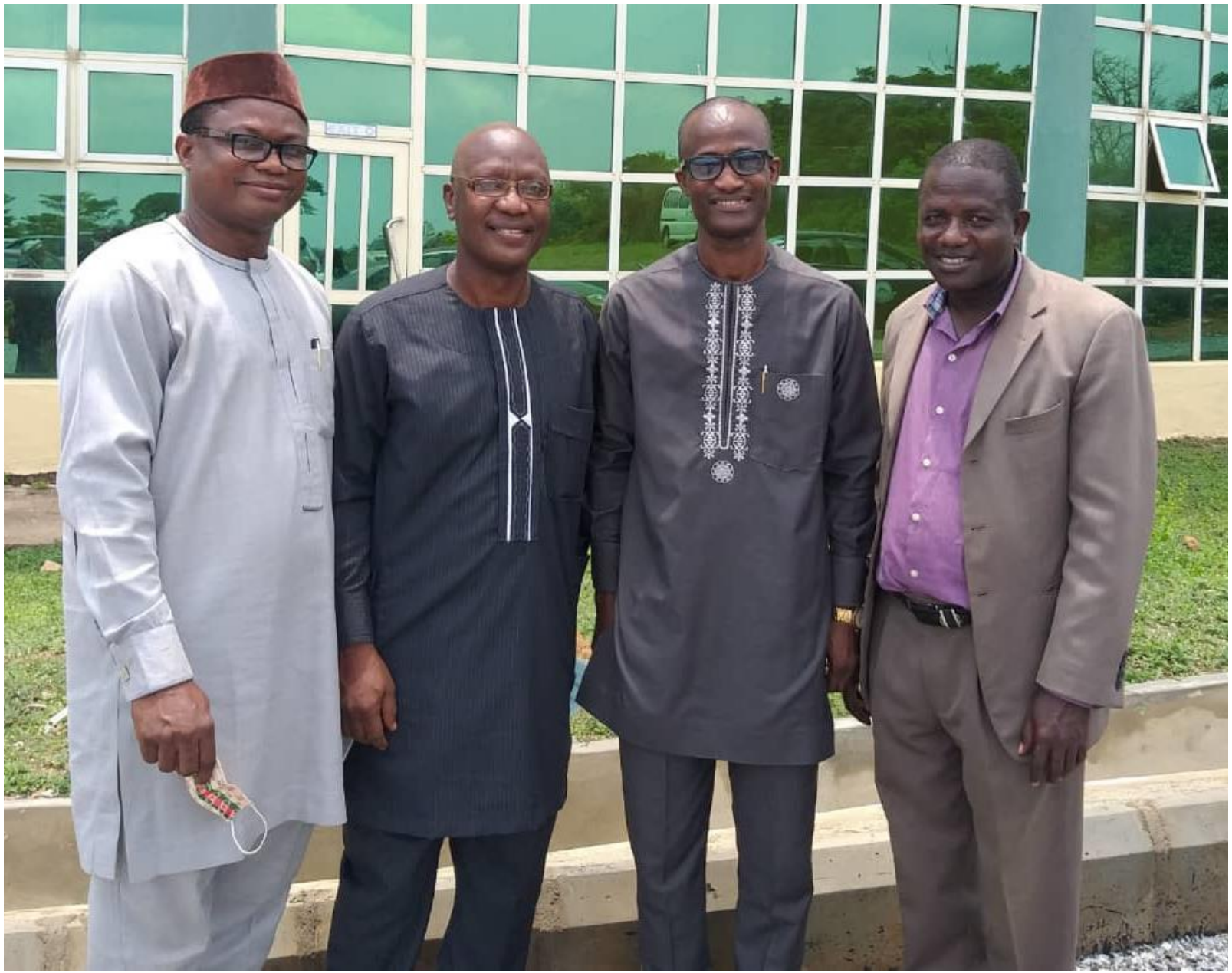
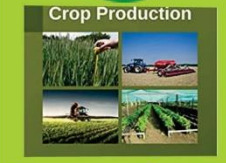
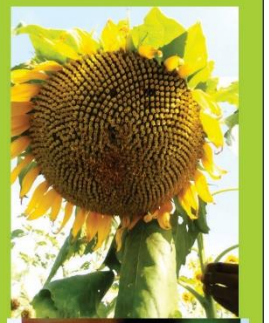
OILSEED RESEARCH GROUP



From the left

Dr. A.A Soretire (SSLM) , Prof. V.I.O Olowe (IFSERAR), Prof. O.A. Ekinuomehin (CPT) , Prof. C.O Adejuyigbe (SSLM)





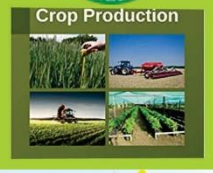

COLPLANT FAMILY

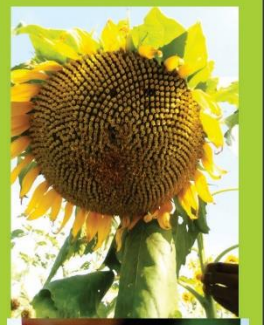
My sincere appreciation goes to all the past Deans and the present Dean (Prof. M.O. Atayese) of COLPLANT.

My close colleagues in the College, Profs. P. O. Adetiloye, F. O. Olasantan, O. J. Ariyo, J. A. Adigun, J. G. Bodunde, O. A. Enikuomehin, M. O. Atayese, A. A. Oyekanmi (my HOD, PPCP), I.O.O Aiyelaagbe, S. O. Adigbo, Tom Fabunmi, J.J. Atungwu and Dr. S.O Sakariyawo just to mention a few.

All the other Professors, teaching and non-teaching staff in the College are highly appreciated.


College of Plant Science & Crop Production (COLPLANT)






SPECIAL TRIBUTES

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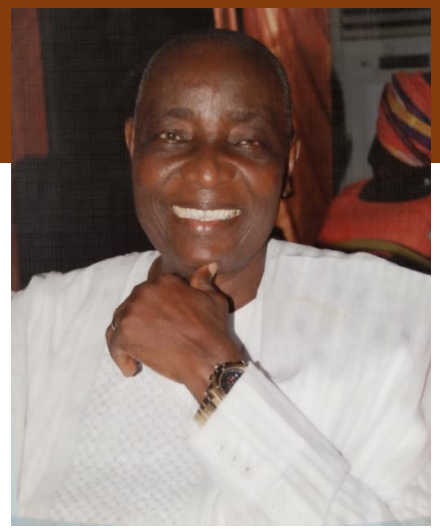
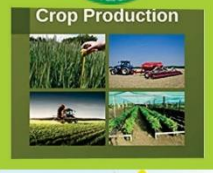
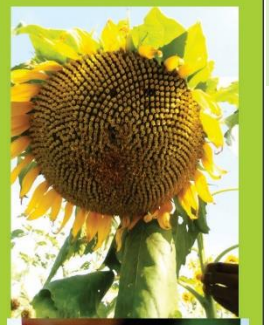
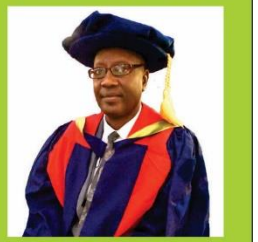
- LATE PROF. I. F ADU (COLANIM)
- LATE PROF. K. A OKELEYE (COLPLANT)









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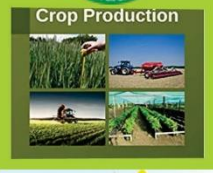

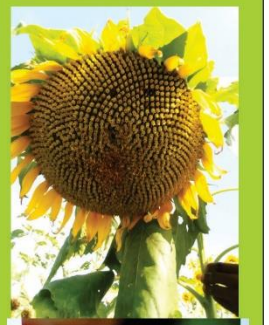

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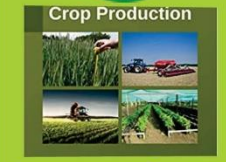
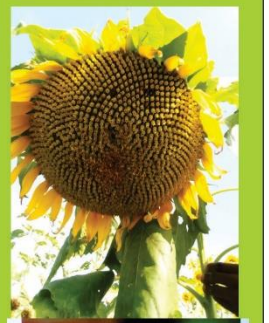
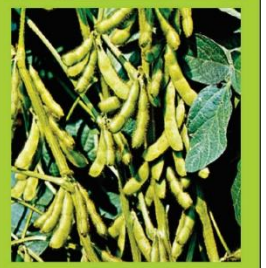
ORGANIC AGRICULTURE PROFESSIONALS IN TERTIARY INSTITUTIONS IN NIGERIA

(2005-TO-DATE)







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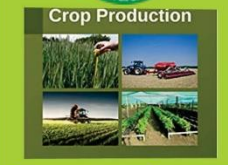
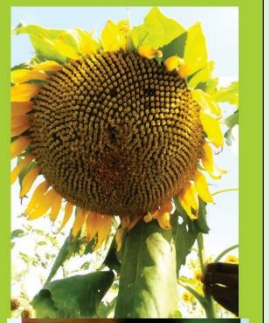
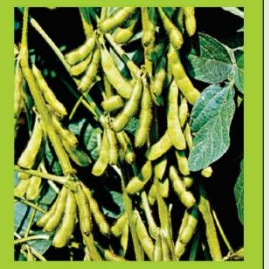
ASSOCIATION OF ORGANIC AGRICULTURE PRACTITIONERS OF NIGERIA (NOAN)

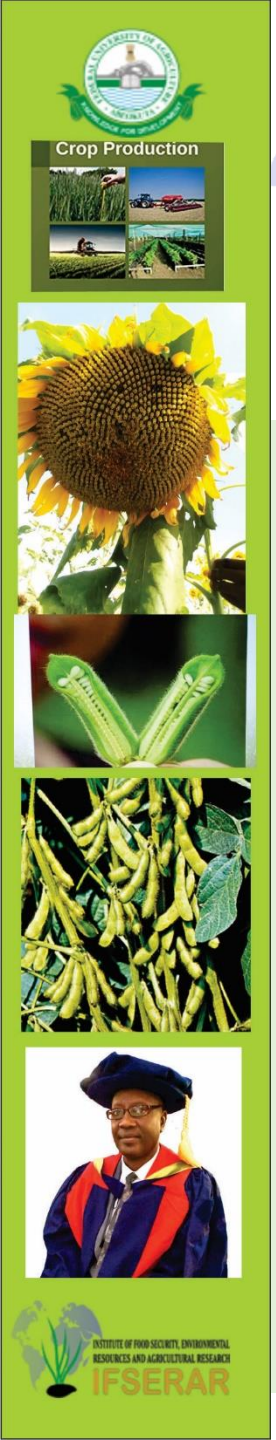
(2009- TO DATE)







AGRICULTURAL MEDIA RESOURCES AND EXTENSION CENTRE (AMREC) (2015-2018)



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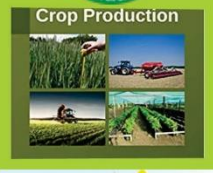
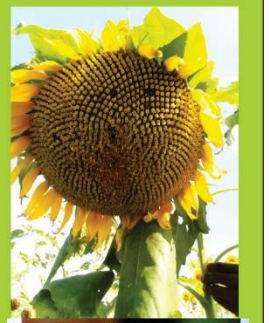
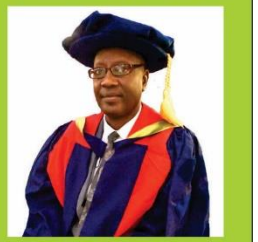




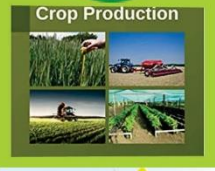
SPECIAL APPRECIATIONS

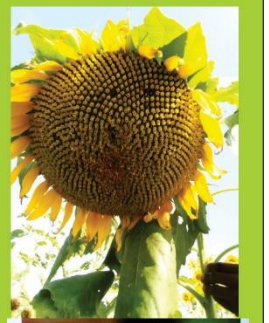
- ALL MY GRADUATE AND UNDERGRADUATE STUDENTS
- E-75 SET OF EKO BOYS' HIGH SCHOOL, LAGOS
- LANDLORDS IN ELITE ESTATE, GBONAGUN, ABEOKUTA & GBONOGUN CENTRAL.
- MEMBERS OF THE APOSTOLIC CHURCH NIGERIA, PANSEKE DISTRICT, IGBORE AREA.

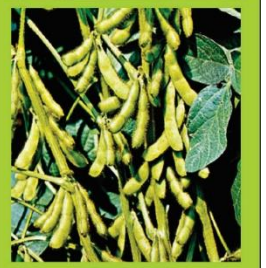
NUCLEOUS FAMILY

Deaconess Rebecca Olawunmi Olowe

Emannuel IbukunOluwa Olowe , Timothy AyoOluwa Olowe & Nehemiah AnjolaOluwa Olowe







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THANK YOU FOR LISTENING