PROJECT TITLE: MASS PRODUCTION OF PREMIUM DATE PALM SEEDLINGS USING TISSUE CULTURE MULTIPLICATION TECHNIQUES.

INTRODUCTION:

The date palm is a high value crop in Northern Nigeria where a large proportion of the available land is suitable for commercial date palm production. Date production is already well established in this area but it is mostly practiced in homestead. Nigeria has a lot of potentials to be one of the world foremost producers of date as a result of the land mass and suitable environment for date cultivation but unfortunately according to the global statistics Nigeria is not reckoned with as far as date production is concerned. From the Nigerian annual date production in 2008 the country was able to produce 21,000 Metric Tons placing it far below top producers like Egypt, Iran and Saudi Arabia which in the same year produced 1,326000,1,000000 and 982000 metric tons respectively. This low production of 21,000 MT fall far short of even local demands. A major limitation to expanded cultivation is the non-availability of sufficient planting materials for growers. The availability of good quality planting materials (premium) in large quantities will be of immense benefit and is indeed a prerequisite for the date industry in Nigeria. However a long standing limitation to the growth of the date palm farming activity has been mainly the biological constraints of female planting materials production that will satisfy the demand. Date palm is dioecious and the consequence of the dioecious nature of date palm is that seed derived seedlings are highly heterozygous. In addition about 50% of seed derived seedlings will statistically be expected to be males, but in reality only a few male palms are required in commercial plantations as sources of pollens, the other being fruit bearing female palms. This challenge with others like low fruit production resulting from low yielding planting materials and low rate of regeneration when off-shoots are used for propagation have seriously constrained the establishment of large National programs to promote intense cultivation of this crop.

The Nigerian Institute for Oil Palm Research (NIFOR), from over 15 years of research has developed protocols of in vitro multiplication of date palm using tissue culture technique to address these challenges to produce date palm planting materials. Currently in partnering with Agricultural Research Center, Horticultural Research Institute, Egypt, a capacity for mass production of date palm planting materials was achieved or obtained.

This proposal is therefore submitted with a view to making the results of the research efforts available to farmers.

OBJECTIVE:

The broad objective of the NIFOR date palm biotechnology programme is aimed at providing high yielding, early maturing and disease resistant female date palm planting materials (premium) to farmers. This involves the multiplication of large scale elite genotypes through tissue culture technique for distribution to farmers .The date palm in-vitro multiplication research effort has succeeded over a decade ago and a number of date palm plants have been produced.

The specific objective of this proposal is to translate these positive experimental successes to farmers gains by scaling up the production of female date palm tissue culture plants for distribution to farmers. The result of these will be the availability and provision of large numbers of improved and best possible planting materials locally. This will in turn lead to wealth creation due to large scale improvement in the livelihood of the rural farmers and very significant poverty reduction.

STATEMENT OF THE PROBLEM:

This project grew out of prior interactions when farmers identified some of the problems/challenges affecting the date palm cultivation in the date palm regions of the country. In an effort to engage all stakeholders to develop the date palm industry and create jobs, wealth as well as increase food production, NIFOR partnered with all stakeholders (Table 1b) to establish the Jigawa State innovation platforms for the date palm value chain.

In the platform NIFOR established the potential gains of developing the date industry. Highlight was the emphasis on the reason for the setting up of the innovation platform. It was a platform for the stakeholders to jointly identify problems/ challenges to enhance the date palm productivity and value chain; propose solutions to these challenges and implement these solutions leading to the promotion of agricultural innovations along the date palm value chain.

The key issues included:

- The dioecious and outcrossed nature of the crop.

- Low fruit production resulting from low yielding planting materials.
- Low rate of regeneration when off-shoots/suckers are used.
- Pest and diseases
- Long gestation period
- Lack of good knowledge on agronomic practices
- Poor government participation
- Lack of funding
- Lack of processing facilities
- Lack of public awareness

Lack of date palm master policy

Together the stakeholders proposed solutions and developed joint action plans. One of the proposed plans of action to solve the challenge of the dioecious nature of the crop is to produce high yielding, early maturing and disease resistant tissue culture date palm planting materials with good fruit and for distribution to farmers.

To this end NIFOR already screened a large collection of available date palm germplasm in her five gene pools and other homestead collections at Its Dutse date palm substation from which high quality (premium) date palms have been identified and classified. Some of the identified and classified palms included those palms that come into early bearing as early as between 18 months to 30 months. Such premium (high quality) female palms will be multiplied for commercial production using tissue culture technique. With this established protocol exotic date varieties like Mejoule, Deglenoir and Ajwa which are of no high quality will also be introduced.

FEASIBILITY STUDY OF STUDIED LOCATIONS

NIFOR also carried out a feasibility studies of some locations in Jigawa State where date palm is cultivated.

The basic reasons for this study are:

(i) To identify the major Date palm farmers in the areas/communities where this project is being carried out. The two main communities are
  (a) Dutse Communities
  (b) Birnin-kudu Communities

(ii) To know the level of their economic resources particularly from date palm

(iii) To know their level of technology awareness on date palm cultivation

(iv) To identify the level of utilization of the technology

(v) To identify the construction in cultivating the date palm in their communities

(vi) The possible solutions to overcome the constraints and the way forward to develop the date palm sector of their livelihood activities

Study area

The two communities i.e. (Dutse and Birnin-kudu) are communities in Jigawa State of North East zone of Nigeria.

The two communities are located in two local Government Areas of Jigawa State.

Dutse community is located in Dutse Local government Area of Jigawa State.

The two communities are located between latitude 11^0 . 42 N all 11^0 .04 N and between longitudes 9^0 20 E and 9^0 31 E.

The major language spoken in both communities are Hausa, Fulfulde and Banawa.

Most of the arable crops grown in the two communities are maize, millets, beans sorghum, rice, groundnut, cotton and sesame and the free crops are Date palm which is the major and on plantation size, cashew, mangoes, oranges and guava.

NIFOR Date palm Sus-Station is located in Dutse Town.

POPULATION OF STUDY

The population studied are Date Palm farmers in the two Communities.

Sampling Procedure and Sample size

Simple randomized sampling techniques were used to select two villages in each community.

In Dutse Community, Gango and Kango villages were selected while in Birnin-kudu Community Dumas and Iggi villages were selected.

Purposeful technique was not used to select the villages because the two communities are main Date palm growing zones in Jigawa State.

Simple Size

In each of the four villages (i.e. Gango, Kango, Dumas and Iggi) ten major Date palm farmers were selected based on the Date palm farmers records collected from Jigawa Agricultural Rural and Development Authority (JARDA).

Instrument Used for Data collection

The instrument used for data collection was a pre-tested and structured interview schedule guide.

Data Collection

The data for survey was obtained from the structured interview schedule administered to the 40 Date palm farmers in the four villages by NIFOR, Date palm Sub-station staff and JARDA Extension Agents as study enumerators.

RESULTS AND DICUSSIONS

Table 1:1 Demographic characteristics

Farmers Age group	**Frequency**	**Percentage**
Up to 30	2	5
31-40	7	17.5
41-50	18	45
51-60	10	25
61-70	2	5
71 and above	1	2.5
Sex		
Male	40	100
Female	0	0
Religion		
Islam	40	100
Christian	0	0
Traditional		
Marital status		
Single	1	2.5
Married	38	95
Widow	1	2.5
Number of wives		
One	5	12.5
Two	24	60
Above 2	11	27.5
Family size		
1- 5	5	12.5
6 - 10	14	35
11- 15	18	4.5
>15	3	7.5
Educational status		
No formal education	28	57.5
Primary education	10	25
Secondary education	0	0

The figure in Table 1:1 reveal that both the young and the older respondents represent 25% and the larger proportion of 62.5% of the respondents' one between 31 and 50 years representing the middle age group constitutes the bulk of the date palm farmers. This result is similar to that of Ajayi *et al* (2010) who reported majority of farmers to be between the ages of 31 and 50 years.

Sex: The table 1:1 shows that all respondents in the study area are male 100%. In the study area, women do not generally own properties like land, economic trees etc but such properties are rather transferred to their husband when they marry. Another reason could be that other farmers have easy access to land than their female counterparts (Oladeji and, 200).

Religion: The table reveals that all the respondents in the study area were 100% followership of Islam faith.

Marital Status: Table 1:1 95% of the respondents were married while 2.5% were widower. Only 2.5% are single.

Number of wives: Table 1:1 shows that 12.5% of the respondents have one wife while 60% of the respondents have two wives and 27.5% have more than two wives. This means that 87.5% of the respondents have more than one wife which is the predominant features in the study area.

Family size: The results in table 1:1 shows that 45% of farm households had 11-15 member followed by 35% for household of 6-10%, 12.5% for household of 1-5 and 7.5% for household members of 15 and above members.

This result can be inferred from the fact that in the study area whereby parent, children and other relatives lived together as household. Ekwe *et al* (2009).

Table 1:1 shows that the respondents with no formal education are the majority with 57.5%, while others with formal education of primary, secondary and tertiary have 25%, 5% and 0% respectively. It is good to know that education is very crucial form of any knowledge to be learnt, acquired and possibly the utilization. Hence one cannot speak of technological utilization without knowing the educational attainment of the individual. Sound education impacts on the farmers the ability for a balanced assessment of any innovation being transferred to them and high educational status of individual to enable them to better assessment of the technology Ekwe *et al* (2008).

One of the key findings of the study is the willingness among the date palm farmers to increase date palm cultivation if assisted with the right planting materials (premium). Hence, NIFOR from intense research effort developed the tissue culture multiplication technique to produce premium planting materials for the present day date palm farmers and prospective one.

This proposal therefore is to translate these successes to farmers gain.

RESEARCH METHODOLOGY (How the project will be implemented)

- The concept of integrated agricultural research for development (IAR4D) which is premised on the innovation system approach and requires systematic interaction among all stakeholders along commodity value chain will be used to implement this project.
- The project will take into account three levels of innovation platforms:-strategic platform, operation platforms and innovation clusters to advance the elite tissue culture date palm planting materials improvement in selected adopted village sites in Jigawa State.
- Farmers groups and communities with mutual interest around the same commodity date palm will operate at cluster levels.
- Innovation platforms will be constituted at adopted village sites to facilitate and strengthen interaction between multi-stakeholders engagements to improve performance of commodity value chain

In this project therefore, innovation platforms will be created and strengthened on which stakeholders (Table 1a,1b) will interact to jointly identify problems, device solutions and implement solutions to enhance date palm productivity as value chain at the two adopted sites in the date palm growing State of Jigawa.

TABLE 1A PARTNERS AND THEIR ROLES IN THE PROJECT

Partner type	Partner organization	Role
Agric.res. organizations and extension service	NIFOR, Jigawa, Res. Inst., Horticulture Res. Inst. Giza Egypt	Provide technology research leadership (coordination) action research on crop production management, analysis, synthesis and national dissemination of research result
		Adaptive trial using participatory action research and learning scaling- up\ out technology participatory training of stakeholders, facilitate market development. Capacity building
	Extension service, ADPs	Involve in capacity building, knowledge and information management and participatory action research
Private sector, Agribusiness entrepreneurs	Fertilizer producers and suppliers	participate in policy analysis and formulation and advocacy for policy change, market analysis and development, information sharing and PM&E.
Policy makers	Two (2) local government in Jigawa State (Dutse and Ringing)	Member of the IP who provide policy support for the activities of the IP.
Small scale farmer	Householders	Involve in community base plant production scaling up, knowledge and information management, participatory action research and learning. End users.

TABLE 1B: KEY STAKEHOLDERS

S/N	Stakeholders	Functions
1	Agric. Scientist	Experimentation with farmers to produce plants, promotion of plants.
2	Jigawa, Research Institute	Tissue culture propagation
3	Horticulture Res. Institute Giza, Egypt	Consultant Tissue culture propagation
4	NIFOR Benin city	Tissue culture propagation, Molecular analysis
5	NIFOR Dutse substation Jigawa state	Germplasm screening and nursery
6	Policy makers (Govt. ADP"s)	Providing enabling environment/encourage farmers, training, promotion
7	NGOs	Planting materials promotion/utilization, provision of fertilizers
8	Small Scale Farmers	End users
9	Marketers	Outlets and sustainability of planting materials
10	Private Sectors	Planting materials distribution
11	Extension services	Training and promotion, seeding distribution
12	Input-suppliers	Provision of fertilizers
13	Radio/TV stations	Radio Jingles, promotion

EXPERIMENTAL PROCEDURE FOR TISSUE CULTURE TECHNIQUES:

Procedure for the tissue culture multiplication is mainly somatic embryogenesis which involves the following steps:

- Ortet selection and initiation
  Plant materials will be collected from selected mature fruiting high yielding, early maturing and disease resistant trees. Ex-plants will be mainly mature/immature inflorescence tissues.

- Tissue culture techniques:

Two methods of micro-propagation will be used: Direct and Indirect somatic embryogenesis. Plant regeneration via direct and indirect somatic embryogenesis will involve the following steps.

- Culturing primary inflorescence (female) on media supplemented with suitable plant growth regulators to initiate embryogenic and organogenic cultures.
- Proliferation/multiplication of embryogenic and organogenic cultures
- Regeneration of shoots
- Shoot proliferation/multiplication for commercial production
- Rooting of shoots
- Plantlet acclimatization

A. Establishment of Nurseries:

Planting out of tissue culture palms.

RESULT ALREADY OBTAINED IN THIS RESEARCH AREA

NIFOR has worked assiduously over the years to establish a reliable date palm in vitro regeneration procedure. Very useful results have been obtained and different protocols developed. In the somatic embryogenesis pathway, a comprehensive and efficient date palm tissue culture protocol for use with different explant sources is available for routine use in our laboratory (Asemota *et al*., 2006). We are able, with this process to generate somatic embryos and produce date palm plantlets (Asemota *et* al., 2008 and 2010). We have likewise obtained date palm in vitro plants from the direct organogenesis method (Eke *et al*., 2003). In partnering with a consultant from agriculture research center, Horticultural Research Institute, Egypt, a capacity for large scale production was achieved (fig.1) (Emoghene *et. al*., 2024 (in print), Emoghene *et. al*., 2024 (submitted for publication)

Figure 1: Project Flow Chart (A-L are the results obtained from the different stages of responses).

A- Inflorescences explant

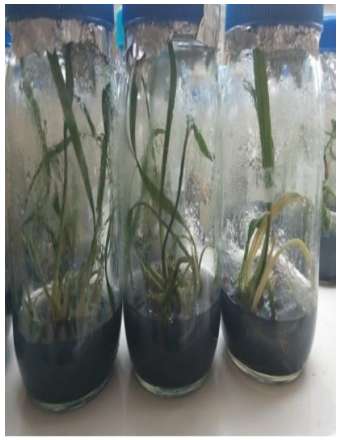
B- Sucker explant

C- Callus response from inflorescences

D- Direct somatic embryo

E- Embryo multiplication

F- Shoot multiplication and development



G- Shoot elongation

H- Rooting of plantlets

I- Plant Acclimatization

J- Hardening plants

K- Plant in the field

L- Fruiting and suckering palm

PROJECT DURATION: The duration of the project here proposed is five years during which time large scale production of date palm planting materials will be well established and large scale planting materials made available to farmers in Nigeria. It is expected also that at the end of three years, the project will be self sustaining

Work plan for tissue culture procedure

Main activities	Timeline (months)									
	0-6	7-12		13-18	19-24	25-36				
Culture initiation		→	--		--		→			
Somatic Embryogenesis			→		--		→			
Plantlet formation					→		→			
Plant's acclimatization								→	→	
Nursery establishment										
Awareness creation (extension) to date Palm growing States								→	→	

EXISTING FACILITIES

NIFOR has date palm germplasm collection at its date palm substation, Dutse to screen and multiply from. The institute also has a competent, focused biotechnology research team and a biotechnology laboratory. The laboratory though not very new is equipped with growth rooms and is projected to produce between 300,000 to 500,000 planting materials annually when operating at full capacity. However some majoy renovations will have to be made on both the laboratory and greenhouse to perform optimally. In addition a solar system to serve the entire laboratory will be installed for optimal performance.

BUSINESS PLAN: Mass Production of Premium Date Palm Planting Materials

1. **Executive Summary**

   The premium Date Palm Propagation Project seeks to transform Africa's date industry by addressing one of its greatest challenges-the shortage of reliable high-quality planting materials.

   Our team already operates a functional tissue culture laboratory and nursery, providing a solid foundation for success.With targeted up-grades and expansion, we are positioned to scale into a scale of the-art facility capable of producing up to 500,000 disease-free genetically uniform seedlings annually within five years.

   This initiative combines proven expertise with visionary growth, ensuring a consistent supply of premium seedlings for farmers, commercial plantations, governments and NGOs. With rising domestic demands and initiative expert opportunities in the Middle East, the project represents a low-risk, high-impact agribusiness investment.

   By scaling up our operation, we will not only meet the regions urgent need for reliable planting materials but also unlock new income opportunities, strengthen food security, and drive long-term economic growth.

2. **Business Overview**

   We currently manage a working tissue culture laboratory and nursery, seedlings at a modest scale. The project's objective is to up-grade equipment, expand greenhouse capacity, and strengthen technical operations in order to meet rising market demand.

   With these improvements, we will establish ourselves as the leading source of premium date palm seedlings in Africa, bridging the supply gap and enabling sustainable orchard development.

3. **Market Opportunity**

   Global market

   - The global date market is valued at over S20, billion, with consistent or steady annual growth.
   - Middle East and North Africa remain dominant producers, but Sub-Saharan Africa shows strong expansion potential.

   Regional market (Africa)

   - Nigeria, Ghana, Sudan and the Sahel Countries show increasing demand.
   - A chronic shortage of quality seedlings limits orchard expansion and productivity.
   - Importation of seedlings is expensive and unreliable, creating a strong case of local production.

- This project provides the solution: Mass local production of disease-free uniform seedlings that meet both domestic and international standards.

4. **Product and Services**

Core Products

- Premium tissue-culture derived date palm seedlings ensuring uniformity, high yield and disease resistance.

Additional Services

- Orchard establishment and management consultancy
- Training programs for farmers cooperatives and extension officers.
- Contract propagation for governments, NGOs and commercial estates.

5. Technology and Operation

The project will leverage our existing laboratory and nursery operations while introducing upgraded tissue culture equipment (bioreactors, sterilization systems, solar systems and climate control chambers).

-Reconstruct greenhouse and nursery capacity for acclimatization and hardening.

-Quality control protocols to ensure uniformity and disease-free materials.

6. **Financial Projections**

Year	**Seedlings/Seedlets Produced**	**Unit cost(₦)**	**Revenue(₦)**	**Notes**
1	_	_	_	Pilot Scale after upgrades
2	1,000-3,000 seedlets	5,000	5,000,000-15,000,000	Seedling operations
3	10,000 seedlings	5,000	50,000,000	Break-even achieved
4	50,000	5,000	250,000,000	Increased efficiency and demand
5	300,000-500,000	5,000	1,500,000,000 - 2,500,000,000	Full capacity achieved

7. **Funding Needs**

We are seeking in funding to support upgrades and expansion. Allocation will be as follows:

(i) Laboratory and technology upgrades
(ii) Greenhouse and nursery rehabilitation
(iii) Skilled staff recruitment
(iv) Consult
(v) Consumables and maintenance
(vi) Marketing and operations

8. **Call to Action**

The Premium Date Palm Seedling Production Project is ready to scale a proven model into a regional power house. We invite investors, governments and development partners to join us in building capacity for premium date production, enduring a steady supply of planting materials supporting farmers and unlocking new economic opportunities.

EXPECTED SUPPORT

This proposal therefore requests support with the logistics to implement it. The funds that will be for scale up operations are intended for installation of solar systems in the laboratory, rehabilitation of the greenhouse travels, procurement of glassware, growth regulators, reagents and consumables, a project vehicle for monitoring. For the scale up aspects, four laboratory technicians and six greenhouse attendants will be engaged for the project. A net house (30×40m2) will be required at Dutse sub-station for nursery operations. A sensitization meeting with stakeholders will be held at months into the project to announce the availability of the planting materials and encourage farmers to take advantage of the project outcome. A breakdown list is attached.

EXPECTED OUTCOME OF THE PROJECT

It is expected that the output of this exercise will be the production of at least five hundred thousand seedlings within five years for distribution to farmers in the date growing belt of Northern Nigeria. This will correspond to over one thousand hectares of date palm plantings in the Northern parts of Nigeria.

Successful execution of this project will provide the necessary large number of female date palm planting materials for distribution to farmers. When fully operational it is expected that over five hundred thousand plants will be produced annually. The project is expected to be self-sustaining at the end of the three years support period and State governments will be engaged in the distribution of planting materials.

POTENTIAL IMPACT OF PROJECT

The date palm program is aimed at contributing to food security in Nigeria. Food security involves the production of enough and good quality food. Improved quality of food will improve quality of life of the general population. The execution of this program will immediately result in large-scale production of seedlings for distribution to farmers and ultimately in the production of much better yields for the farmer. Increased yields will translate to higher incomes for the farmer. The higher income generated will sustainably improve their standards of living. It is also anticipated that this project will as a further contribution to food security, guarantee stable prices and value addition due to processing of fruits into other products as a result of higher quantities of fruits available. Price stability is not only an incentive to rural places to start planting. The result will be two fold, increased total production and stable prices whose combined effect will be enhanced prosperity. Ultimately, this will also assist the federal government policy of shifting mainstream economic activity away from petroleum oil, at the same time achieving one of the key pillars and initiatives of the Renewed Hope Agenda of this present administration – which is Food Security to boost Agriculture and ensure self-sufficiency and economic empowerment. It will also solve the recent President's call for the planting of 50 million date palm seedlings.

PROJECT IN RELATION TO NATIONAL AGRICULTURAL SYSTEMS

Currently there is a Federal Government of Nigeria program of rural transformation which will benefit directly from result of this project. Rural transformation, alleviation of poverty and food security are all goals of the current 8 point agenda (Renewed Hope Agenda) of the Federal Government of Nigeria. Nigeria will therefore benefit directly from the advances \ Improvement that will arise from this project.

PROJECT ACTIVITIES & OUTPUT

OUTPUT	ACTIVITIES
Capacity of stakeholders facilitated and strengthened to improve performance of commodity (date palm) value chain.	-Setting up the IPs at the two sites -Joint stakeholders analysis to identify constraints and entry points in each community. -Joint stakeholders action plan linked to constraints and entry points.
Planting materials as plantlet for transfer to the Nurseries	-Screening of germplasm in Dutse Substation using morphological, procedures. Biochemical and molecular -Regular initiations and subcultures of the date palm planting materials (explants). -Development of media improvement for different developmental stages of callogenesis, somatic embryogenesis and plantlet induction.
Nursery seedlings issued from tissue culture plants given to farmers at a AVS. Recommend actions and technology package for new planting materials.	Acclimatization and hardening of plantlets
Capacity of farmers and other stakeholders strengthened to improve c adoption of technology package for new f planting materials.	-Training of demonstration protocols and development of demonstration placement schemes for each site of IP level -Development of site specific extension support materials.
Awareness and adoption of the date --palm tissue culture planting material with end-users preferred increased by at	-Joint community action planning linked to constraints and entry points -Training on planting strategies of the plants at demonstration area.

least 20% above baseline level	-Establishment of date palm tissue culture areas -Farmers field days and agricultural shows
Sustainable access to elite female date palm tissue culture planting materials	-Identification of areas of production -Interactive tours to improve market connections and promote farmer-farmer information exchanges and knowledge for sharing -Promotion of linkage with ADPs, NGOs, Private sectors, State Government to ensure sustainability and scaling up of the planting materials being promoted
Technology targeting and deployment strategies Improved by monitoring and evaluation	Baseline survey to establish status of the plants especially in the established Adopted Village Sites -Monitor farmers reactions as they relate to the planting materials being promoted -Determining prospects for adoption in other areas of the state and other date growing states of the country -Encourage Local and State Governments to identify and organize 200 or more families (Men, women, boys and girls) and assist them to establish one or more hectares of date palm orchards/family. -Progressively increase yearly planting by more families over the next 5years. This comes to about 1000 families in 5 years (about 5,000 Individuals/State

Objectively verifiable indicator

- TWO (2) Innovation Platforms set up in the adopted areas of Dutse and Ringin in Jigawa State
- At least 2 reports of community analysis
- At least 1 summary of Action plan of each area produced
- Protocols for demonstration plots made available
- Training of several farmers in the two demonstration areas
- At least 2 extension audio-visual aids produced
- Extension agents, farmers and marketers trained
- Hold at least two field days and agric shows to properly identify varieties of date palm
- Hold at least 2 training sessions for farmers
- Organize at least two Interactive tours
- Report of awareness creation with at the stakeholders forum that will include 16 State govts of the date palm zone, Local govts, NGOs, etc.
- Report of baseline survey conducted at 2 project areas of Jigawa State.
- Produce 1 monitoring report annually
- Conduct survey on the perception and adoption of the new date palm planting materials

TECHNOLOGY TRANSFER/UPTAKE PATHWAY

In order to facilitate uptake of this technology by the beneficiaries (farmers, research community, the nation) NIFOR will organize annually a growers day. This is a major extension and awareness forum at which stakeholders in the industry (farmers, estate managers, policy makers, local and state government, NGOs) are present. At this meeting, new technologies are introduced to this stakeholders and feedbacks received. In addition to regular participation at field days and agricultural shows NIFOR, also has demonstration plots and demonstration villages where new technologies were demonstrated in collaboration with farmers for their benefit. This project will take advantage of this channels to reach farmers effectively. Complimenting all these, NIFOR also works closely with ADPs in the states.

Disseminating the scientific information will be through publications and other reports normally circulated within the scientific community. All the collaborating partners in this project each of which has its traditional sphere of influence will considerably facilitate the dissemination of the findings ad technology generated from this project. The nation will benefit by enhance output of date palm and its product and enhanced scientific culture to which this project will contribute to.

THE RESEARCH TEAM

Principal investigator- Dr. (Mrs.) Beatrice Onome Emoghene
Principal Collaborator – Dr. C.R. Eke
Facilitator – Mr. Hamza A Mohammed- Co-principal Investigator
Other team members
- Dr. M.N. Okoye
- Mr. U.E. Ubara
- Dr. L. Igene
- Dr. (Mrs.) O.B. Imoisi
- Dr. D.I. Garba
- Dr. P.E. Osayande
- Dr. (Mrs.) T.O. Aondona
- Dr. E.O. Iguodala

Research Assistants - Post Graduate Students from NIFOR and UNIBEN

Budget

Category	Amount	Description
Personnel	10,000,000	Field assistant, research team supervisors
Equipment	4,000,000 350,000 5,000,000	Auto clave (751 capital) Standard microwave Culture tubes with lid (10,000 pieces)
Labour	5,000,000	Setting of innovation platform, baseline survey, field setup and maintenance
Laboratory and Technology upgrade	120,000,000	Solar installation and pilot upgrade
Greenhouse and nursery rehabilitation	15,000,000	Repairing and replacing covers with UV-stabilized materials
Marketing and operations	10,000,000	Ensuring efficient execution of strategies and driving business goals
Laboratory consumables	20,000,000	Reagents/chemical, PCR kits, ethanol, Aluminum foil paper, cotton wool, pipe tips, forceps, scalpel blade holders, nose mask, hand gloves and others.
Data collection and analysis	2,000,000	Travel and field/sites logistics
Travels	38,000,000	Project vehicles
Documentation and report writing	1,000,000	
TOTAL.	**230,350,000**	