

Horticultural Seed Production to Meet National Demand

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ABSTRACT: This paper deliberated on the characteristics of horticultural crops distribution in the natural vegetation of Nigeria. The concept of seed and seed production; traditional seed production; and own-seed saving systems. The challenges to seed production, technologies for prioritized horticultural crops and implantation strategies including government policy, research/training and private seed products etc. were highlighted.

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INTRODUCTION

The natural vegetable predicated on favourable and edaphic factors provides man with array of products services that are vital for survival in a balance economic and environmental development. Prominent among the floristic composition of the vegetation are horticultural crops (fruits, vegetables and amenity plants. Plants utilization, protection and domestication started with horticultural crops especially fruits and vegetables which are eaten raw and experimented with for centuries prior to the discovery of fire and the subsequent ennoblement of roots and tubers and some vegetables which need further processing or cooking. The archeological study of indigenous food plants in Africa including Nigeria and their domestication (Okigbo, 1977) concluded that the continent evolved two agricultural complexes: the seed agricultural complex of the savannas and the vege-cultural complex endemic in the rainforest. The transition from one system to other evens out as an admixture.

Nigeria covers both the forest and savanna vegetation types and land uses. Regardless of the variations that naturally exist in the specific floristic compositions and the intensity of human activities among the vegetation types of Nigeria, each vegetation contains an appreciable numbers of horticultural crops. However, the density and the richness index are higher in the rainforest that in the savanna.

The rapid expansion of infrastructural development and urbanization result in opening up and clearing of hither-to virgin forests directly destroying the wild and semi wild food plants. This destruction in order to create, is proceeding at a much faster rate than horticultural is being developed to cope with the task of collection, identification, domestication and production because these plants increase only at nature's own rate. One of the most important problems in horticultural task is seed production.

Traditionally horticultural seed production is an integral of a farming system. During harvest, heavy yielding fruits are selected, processed and stored in the indigenous own seed saving system. The system is no longer sustainable and therefore calls for improved technologies for horticultural seed production to meet the farmer's and national demands.

CONCEPT OF SEED

Seed is a detachable organ of reproduction in plants from new plants of the same kind grows. Seeds biologically develop from fertilized ovules- seeds or vegetative leaf, stem and root cutting and ex-plants (clones) or both. Technically, seed and clones constitute propagules. Horticultural crops include vegetables (Olericulture); fruits (Pomology) and amenity plants (floriculture). Most vegetables reproduce by seed e.g. tomatoes, pepper, okra, amarathus etc. some vegetables reproduce through seeds and clones (telfairia, water leaf). Similarly some fruits reproduce by seeds (mango, guava, organs) while others reproduce by clones (plantain, pineapple ornamentals) or both or oranges, mango guava, ornamentals). The peculiarities (advantages and disadvantages) of seeds and clones as organs of reproduction are known. To a large extent, the good qualities of each reproductive organ are incorporated into the development of quality (improved) horticultural seeds either by seed or clones through advances in science and technology for an enhanced and rapid multiplication as already developed in breed, grafting, budding and tissue cultural techniques. Seed in this paper are propagules unless otherwise specified.

SIGNIFICANCE OF SEEDS

Naturally, seeds are significant:

- a. Firstly, seeds provide the method of self multiplication, regeneration and perpetuity.

- b. Secondly, seeds provide the survival mechanisms in our adverse short and long term environmental conditions.
- c. Thirdly seeds provide the appropriate disposal mechanism in location, time and space through wind, water or contact with man and animals, e.g. seed introduction.

IMPROVED SEEDS

Improved seed consists of improved variety/hybrid which are achieved by genetic improvement. High quality seed relate to improvements of physical and physiology properties of seeds represents the outcome of series of activities and decisions, the outcome of a process which begins with the initial manipulation of germplasm and identification of suitable variety or hybrid. It further conclusions through multiplication, processing and distribution seed and ends with the farmer uptake and use of the seed. Major functions in this process include quality, processing and conditioning, storage and

transport, seed demand assessment, market and seed promotion.

SEED PRODUCTION

Seed production, simply means timely multiplication of quality horticultural varieties and made available in large quantities for the benefit of growers who maintain the genetic stability and varietal purity during the production stage of breeder, foundation and certified seeds (Uto, 1994). Technically, seed production defines the need, scope, targets, available input resources, and technology. The effective demand projections should (a) establish the number of horticultural crops for multiplication and distribution channels. (b) The hectareage of crop land and its distribution within the country for which seed of each kind and variety needs to be supplied. The absence of requisite seed planning data base poses enormous challenges to horticultural seed production needs in Nigeria.

CHALLENGES OF HORTICULTURAL SEED PRODUCTION

The challenges of horticultural seed production to meet national demand are diverse and complex in nature.

These include, among others.

- Traditional save-own seed culture among the poor growers discourages improved seed adoption.
- Horticultural seeds are usually complex, reproductively divergent and ecologically diverse.
- Some improved technologies for horticultural seed production (clones) are at the laboratory stage e.g. micro-propagation and biotechnology techniques
- Clones have very multiplication ratios (1:4 in pineapples and plantains)
- Very slow bureaucratic procedures exist for the release of few improved horticultural variety.
- Present horticultural seed production, processing, storage and marketing are controlled by poor growers especially women.
- The Nigerian climatic factors (high rainfall, temperature humidity) predispose the seeds to field and storage pests and disease.
- Paucity of trained managerial and technical manpower in seed science, technology, and extension.
- Lack of effective quality seed demand survey data for priority horticultural crops.
 - Poor quality horticultural seeds are sold to uninformed growers by the unscrupulous marketers.
 - Failure of former agricultural seeds e.g. hybrid maize to meet the socio-cultural needs of the farmers.
 - Poor economic environment to drive for private sector participation in horticultural seed industry.
 - High cost and often no-availability of seed processing, storage and protection facilities for long term seed viability.
 - Restricted import licenses and credit facilities for improved seed importation despite the due process.
 - Public sector participation and even subsidy in certified seed production instead of concentration on breeder/foundation stock production.
 - Horticultural clones are bulky, difficult to clone and rapidly deteriorate to poor viability.
 - Lack of commercial tissue cultural laboratories.
 - Horticultural clone production has long gestation period (4-18 months).
 - High bank interest rates scare entrepreneurs.
 - High cost and scarcity of complimentary inputs e.g. fertilizers protectants, packaging, drying facilities.
 - Poor infrastructural and market structures, seed handling and distribution.
 - Incessant political, ethnic and religious conflicts in Nigeria e.g. 29 major conflicts between July 1999 and July 2009.

- Horticultural crops are highly seasonal and environmentally selective.
- Research neglect on endogenous horticultural crops.
- Lack of horticultural crop based industries to drive the improved seed demand.
- Lack of awareness on the economic returns of horticultural enterprises especially floriculture.

TECHNICAL CONDITIONS FOR HORTICULTURAL SEED PRODUCTION

Horticultural crops and varieties are diverse in nature, and ecological distribution and reproduction efficiency. Some are seed based as in the savanna and others are clone based as in the forest zones. Admixtures exist in the transition between the two. Naturally, seed based reproductive organs with higher reproductive ratios e.g. tomato, amaranthus (1:300) have high potential over the clone based e.g. pineapple (1:4) in enlarging and expanding improved seeds to longer area over a short time. Furthermore, the duration of developing the seed varied remarkably between seeds and clones. In addition, the seed multiplication is usually field based and its success is dependent on climatic and production factors as well as available technology. The clones are dependent on specialized technology for multiplication in an environmentally controlled nursery. Thus, a summary of technical considerations (Table 1) was constructed to facilities planning and implantation of selected priority horticultural seed production bearing in mind the multiplication ratio, appropriate technology, expected duration to produce plantable seed in advantaged agro ecological zone. This model is based on cluster concept considering the challenges earlier highlighted. Seed zone are uniform ecological units in natural vegetation delineated for the management and transfer of seed and planting stock. These zones are established on the basis of climatic and physiographic characters for commercial horticultural seed multiplication and distribution. In addition, socio-cultural acceptance, improved structural development, storage and marketing facilities are assumed.

STRATEGIES TO MEET THE NATIONAL HORTICULTURAL SEED DEMAND

In view of the peculiarities and challenges of horticultural crops production in Nigeria, a three prong complementary strategy to sustain short/medium and long term durations. The integrated strategy involves.

- a. Government policy
- b. Research and Training
- c. Private seed Production Partnership

The approaches work in tandem with one another to guarantee timely and availability of quality seeds to growers in the various ecozones. Efforts were also made to define roles and functions of each operational group bearing in mind the operations of the national Seed Service which are grossly inadequate for horticultural seed production especially clones.

GOVERNMENT POLICY

- The highlights of government policy include political will to promote horticultural crops production through favourable economic environment funding, supervision to stimulate private participation.
- Establishment of National Horticultural Seed Council as government policy and implantation of parastatal with zonal offices in each of the six geopolitical zones.
- The Council supervises and priorities breeder and foundation seed production programme planning and implementation.
- Promotes exportation of horticultural seeds to other countries after quarantine certification.
- Infrastructural development, specialization production, processing, storage, transportation, and marketing facilities.
- Funding nationally coordinated horticultural research based on ecological advantage in selected research institutions and universities bearing in mind the nature of horticultural seed production.
- Provides appropriate mechanisms to manage any surplus from private seed growers.

RESEARCH AND TRAINING

- Organized research in mandate research institutions and universities for breeder and foundation seed production.
- Develop varieties that are customized to the resources poor growers e.g. traditional own seed saving technology.

- Breeding high yielding, disease and pest tolerant varieties.
- Development of varieties tolerant to environmental stress including climate change.
- Early maturing varieties with associated inputs and production technology.
- Training of skilled growers.
- Development of improved production, processing strategy and marketing protocols.
- Organize farmers field days and farmers exchange programmes.
- Liaise with growers to chart road map to horticultural innovations.

PRIVATE SEED PRODUCTION PARTNERSHIP

- Based on the state of the art in Nigeria, horticultural seed production is achievable and predicated on.
- Seed production is best in zones of ecological advantage.
- Cluster area approach is adopted in the production of foundation and certified horticultural crops in fairly estimate demand.
- The demand is prioritized based on local needs and preferences in each ecozone.
- Improved infrastructural development of facilitate transportation, sale-point storage and marketing of viable seeds.
- The activities of unscrupulous marketers are regulated.
- Incentive price to horticultural seed growers including price subsidy for seeds and management of any annual surpluses.

In the private seed production partnership: two technical approaches are targeted, small/medium and commercial growers.

SMALL/MEDIUM GROWERS

This informal shop to medium duration approach is predicated on indigenous knowledge systems of horticultural seed growers to satisfy the local needs within an ecozone. The approach motivate locally known and dependable seed growers in the various grow ecological zone to establish small scale horticultural seed production enterprises to multiple and market quality seeds available to the farmers such growers are readily empowered through issuance of satisfies seeds and production package to renovate through cluster technical support system (production machineries, processing, storage and marketing facilities) and the development of internal seed quality control for both internal and external market. The propelling force in small/medium strategy is introduction of certified seeds and the complementary production package (fertilizer, protectant) to local growers who on their own ascertain the superiority of certified over local varieties. The farmers- to farmer extension drives the small/medium scale horticultural seed production. This strategy has worked successfully for some crops and farmers are familiar with the system e.g. smallholder oil palm and cocoa development projects in Nigeria.

MERITS

- Demonstrate the improved seed use under the growers farmers low management technology.
- Easy access to improved seeds in close proximity.
- Reasonable cheap (partially subsistence and good quality seed for growers.
- Motivates farmers to gradual adoption of improved technology with high yield potentiality.
- Existence of several seed enterprise to reduce production risk and better seed demand appreciation.
- Production is focused on local seed with responsive local operations.
- Local competition ensure superior seed quality among growers.
- Production is gender inclusive.
- Potential for empowerment exist especially through cooperative clusters.
- Production is sustained by the commitment of innovative growers to seed production and marketing appropriate for low input horticultural seed multiplication for low demand crops.

DEMERITS

- Production is Limited and concentrated on local needs.
- Several growers of same variety.
- Quality is difficult to ascertain.

- Poor seed storage, mainly traditional, and open to pests diseases environmental stress, reduced variability and seeding vigour.
- Empowerment through out crossing is unlikely.

TABLE 1: GUIDE FOR IMPROVED HORTICULTURAL SEED MULTIPLICATION TECHNOLOGIES IN COMPARATIVELY ADVANTAGED AGROECOLOGIES OF NIGERIA

Horticultural Crops	Multiplication				Agro-ecology
	Unit	Technology	Ratio	Duration months	
Vegetable/plants	Field	* Seed	1:100-500	3-6	NC, NE, NW, SW, SE
Oranges/tress	Nursery	* Budding	1:250	8-24	NC, SW, SE
Plantain/apex (banana)	Lab	* Tissue culture	1:5000	12-18	SW, SE
Banana/plant	Field	* False decapitation	1:10	6-8	SW, SE
Banana/bud	Nursery	* Budd split	1:50	6-8	SW, SE
Pineapple/stem	Nursery	* Stem sectioning	1:50	4-8	SW, SE
Pineapple		* Stem trenching	1:80	4-8	SW, SE
Pineapple/crown		* Crown splitting	1:80	6-10	SW, SE
Pineapple/crown		* Milking	1:100	6-10	SW, SE
Mango/tree	Nursery	* Grafting	1:200	6-8	NC, SW, SE
Guava/fruit	Nursery	• Seed	1:50	4-6	NC, SW, SW
		• Stooling	1:20	4-6	NC, SW, SE
Pawpaw/fruit	Nursery	* Seed	1:200	4-6	All zones
Ornamentals/seed	Nursery	* seed	1:300	1-4	All zones
Ornamentals/cutting	Nursery	* Clones	1:50	4-12	All zones
Telfairia/embryo	Nursery	* Tissue culture	1:50	6-8	SE, SW
Telfairia/stem		* Stem cutting	1:500	4-6	SE, SW
Telfairia/root		* Root cutting	1:20	4-6	SE, SW

Source: Adapted from Ucheagwu and Obiefuna 1983a, b, 1985; Vuylsteke 1983, Vuylsteke and De Langhe 1983, Adelaja *et al.* (1986). Ellis *et al.* 1985; FDA, 1986.

COMMERCIAL SEED PRODUCTION ENTERPRISE

This is an organized enterprise with comprehensive managerial and technical expertise on seed technology ranging from production processing storage and marketing bound product, some of existing commercial seed firms in Nigeria e.g. Premier Seed Nigeria Ltd etc may expand to accommodate Premium National horticultural seed e.g. tomato, pepper onion okra while specialized horticultural seed production the challenges earlier discoursed shall be adequately addressed; worthy of note is that commercial enterprises are mainly interested in high value horticultural seeds with an assured demand and profit to justify the capital investment.

Merits

- Rapid multiplication through tissue culture techniques.
- Programmed seed production of improved and assorted varieties on demand.
- Seed quality is grantee through scientific quality control and brand.
- Timely introduction and marketing of improved seeds.
- Training of local horticultural growers over time is obvious.
- Internal and international seed trade linkages are created.
- Employment opportunities evolve.
- Stimulates small/medium enterprise to innovate.
- Facilities indigenous horticultural seed domestication processing, storage and conversation become available as technical support services.

- Collaborative research and training with Universities through Students Industrial Work Experiences Scheme (SIWES) and technical skill acquisition is developed.

DEMERITS

- Commercial horticultural seed enterprise is capital intensive.
- Facilities (Tractors, fertilizers, processors, storage chambers etc) are imported with our limited foreign exchange.
- Lack of local personal for facility maintenance.
- Horticultural seeds must command high demand value.
- Production package is technical and probably expensive and so unaffordable for local growers.
- Constitute a big threat to myriads local enterprises.
- Production is environmentally specific to guarantee brand quality.
- Improved seeds threaten endogenous horticultural genetic resources.

CONCLUSION

The challenges of horticultural seed production, though enormous have created tremendous opportunities for horticulturists. Political will is critical to drive research, training, and favourable environment for private participation in certified seed production. Horticultural production to meet the national seed demand is achievable through the integrated approach of effective government policy, demand driven and innovative research and production in clusters of ecological advantage.

REFERENCES

1. Ellis, R.H. Hong T.D and Roberts, E.H. (1985). Handbooks for Genebanks No. 3 Handbook of Seed Technology for genebanks. Vol. II, *Compendium of Specific Germination Information and Test Recommendation*. IBPGR Pp. 221-223.
2. FDA Federal Department of Agriculture (1986). Technical Packages for Crop Production Volume IV, *Vegetables and Fruit Trees* P. 3-60 Gupta 1994.
3. Marine, N.S., Okolo, T.O and Fajana R.D (1996). An overview of privatization of seed industry in Nigeria Paper presented on Privatization of seed industry in Nigeria, University of Agriculture Malemidi, March 1996.
4. Shobowale, O. J (1994) Strategy for fulfilling formation and certified seed requirements. In Evolution of Nigeria Seed Development Plan. Eds Adedipe Usman and Maini, Pp 121-132.
5. Ucheagwu, A. C and Obiefuna, J. C. (1983a). The effects of anterior middle and posterior pineapple slumps in generation of propagates. *Proceedings 6th Annual Conference of Horticultural Society of Nigeria, University of Nigeria, Nsukka*, Nov. 1983.
6. Ucheagwu, A. C and Obaiefuna, J. C. (1983b). The use of clones in rapid multiplication of pineapples (*Ananas comosus*). *Proceedings 6th Annual Conference of Horticulture Society of Nigeria, University of Nigeria Nsukka*, Nov. 1983.
7. Ucheagwu, A. C. and Obiefuna, J.C (1985). Segment removal of plantlets from crown splits for propagated proliferation in pineapple (*Ananas comosus*). *Proceedings 7th Annual Conference of Horticultural Society of Nigeria*. August 4-8-1985, ASCON, Nigeria.
8. Utoh, N. O (1994) Seed production planning and implementation in evolving the Nigerian Seed Development. Plan Eds Adedile, Usman and Miani. Pp 115-120.

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