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TRAINING REQUIREMENTS FOR AGRICULTURE IN THE 21ST CENTURY

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ABSTRACT

It is debatable whether entrepreneurship is a discipline, an aptitude or an attitude or probably all three; but the time has come to identify and reinforce courses in agricultural economics which can help a future graduate set up a farm confidently and successfully. It will take some co-ordination and re-organization of the internship year such that each student association within NAAS (National Association of Agricultural Students) can mount a pilot mini-project in each identified area of need, e.g. poultry, pigs, rabbits, vegetables, ornamental plants, organic fertilizers, orchard gardens, soya milk, soya cakes, etc. The NAAS and the faculty leadership can solicit funds for this novel enterprise which will enhance confidence, competence and proficiency for our graduates of the 21st century.

INTRODUCTION

Nigeria, like the rest of the underdeveloped world was an onlooker in 20th century technology which was essentially mechanics-driven: internal combustion engine, electricity, microchip, jumbo jets, televisions, internet, tractors, nuclear weapon's and delivery systems, laser beam, space exploration- all based on physics and chemistry and all focussed on improvement of life and life activities. As a consequence we remain obligate consumers of substandard products of these technologies, since we lack the capacity to evolve an expertise base that is fed by research and infrastructure which can sustain further development.

The 21st century on the other hand promises to usher in a technological era that is dominated by biology, focussing on the cell and holding the potential of altering life itself, of creating new forms of life or components of life, of hastening evolution, of eradicating plant and animal diseases and of revolutionizing food production for exploding human populations.

The question that now arises is: can Nigeria afford to remain a by-stander in the unfolding scenario of biotechnology - the application of biological science to the manipulation and use of living things for human ends-with its bulging human population; with its expanding food deficit and with its myriad of endemic human, animal and plant diseases? If the answer is a resounding NO which I assume it must be, now is the time to examine our players, our tools and the playing field.

Agriculture is the ultimate beneficiary of a biological miracle called biotechnology, and since "The Third World is a biological World", its permanent member, Nigeria must take urgent steps to win a shirt in this new competition. Nigeria agriculture in the 21st century must start by calling its players to camp, training and retraining them in state of arts and providing all necessary tools for them.

HUMAN RESOURCES

The ultimate wealth of a nation is its human resources. It is the human resources that can explore the mineral and natural endowment, develop and regulate its economy in the path of progress and organize its political and social systems towards justice, equal opportunity and peace.

The task of any generation is therefore not only to explore, mobilize, consolidate and liberalize exiting resources but more importantly to develop the incoming generation to a state that

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can consolidate on the visions of the founding fathers and also be capable of discovering new resource avenues when exiting endowments are depleted or exhausted. This is the secret of the developed nations which have evolved a culture of succession and empowerment of succeeding generations, as well as that of a few really developing nation which have learnt their lessons. As Freeman Clarke put it: "politicians think of the next election but statesmen think of the next generation". Unfortunately underdeveloped counties including Nigeria have tended to breed more politicians than statesmen and the result is an endangered future generation without adequate skills to cope with an ever-challenging and competitive world. The direction which the training of future agricultural scientist should follow is to ensure that they are adequately prepared in the acquisition of skills and expertise necessary to transform their environment and to adopt exiting technologies to solve their national problems. In the words of the vision 2010 committee "the emerging forces that are shaping the world are globalization, technology and liberalization. Each country has to adapt to these forces in order to take advantage of the benefits available therefrom. How well Nigeria adapts to the forces will determine her success in the next millenium". To identify specifically what should be done in this regard it is necessary to take a critical look at the exiting curriculum, for the B. Agric programme offered by the Faculty of Agriculture, UNN.

CURRICULUM

The first curriculum of the university of Nigeria developed in 1960 was a radical departure from the contemporary structure of pin-hole packets of knowledge designed by colonial Britain to fit into specific requirements of the civil service. The UNN curriculum incorporated for the first time in Nigeria a general studies programme that sought to broaden the foundation of graduates across humanities and basic science. This UNN initiative was later adopted by all Nigeria Universities.

In 1975 the agriculture curriculum was revised by the Faculty of agriculture UNN under the able leadership of its Dean, Prof. A.N.A. Modebe. The new structure consists of a common 3 years for all agriculture students (including general studies), a fourth year of practical work internship and a final year of specialization in departments. This 5-year programme was in effect a common services agricultural programme which sought to expose all agricultural graduates to core agricultural courses, such that, regardless of the area in which they intend to specialize, they would be conversant with basic agricultural theory and practice. By virtue of this specialization in the fifth year our agricultural graduates are prepared for careers in the civil services, parastatals, industry, graduate studies and even self employment.

In content, this programme was comprehensive as it covered courses of instruction, laboratory and field practice in all areas in which an agricultural graduate was expected to operate in the field. In outlook it was robust and broad, as each graduate had at least a general knowledge of areas outside his specialization. With these features and characteristics this programme was enthusiastically adopted by all universities offering agriculture in Nigeria. The Association of Deans of Agriculture in Nigeria Universities later officially endorsed it after conducting a nation-wide questionnaire research from all industries and employers of agriculture graduates on the adequacy and performance of such graduates in 1985.

In 1989 the National Universities commission developed minimum academic standards for all Nigeria Universities. For agriculture it endorsed the exiting 5-year programme - its philosophy, its structure and a few modifications in content relating to course description, credit loading and grade point average. This document which is titled "Approved Minimum Academic standards" formed the basis for the accreditation of all Universities in Nigeria and is currently in use.

It is this document which I intend to examine and assess in its ability or otherwise to produce an agricultural graduate of the next millennium, in three mainareas of focus.

1. Biotechnology
2. EnvironmentalIssues
3. Entrepreneurship

BIOTECHNOLOGY

Modern technology was and still is hardly comprehensible, to the Nigeria mind, much less accessible as a routine tool. The Igbo translation of technology is *Ogbara Igbo Ghari* meaning - wonder to the Igbo mind. Biotechnology will be worse - probably bewildering to the Igbo mind! Examples abound in local conferences, village gatherings and even churches where the use of common public address systems and projectors often leads to embarrassing situations. It sounds therefore preposterous that one should advocate biotechnology in these circumstances. But the agricultural scientist of the 21st century has no choice, and vision 2010 has already outlined major constraints of agriculture as, among many others,

- Continued dependence on nature for performance;
- Weak and poor funding and inadequate technological support for peasant farmers.
- Failure to transfer technology to the sector etc.

We have learnt our bitter lessons with the internet and its global information dynamics. A computer illiterate cannot operate in the U.S. just 30 years after the microchip and only 5 years after the information super highway were developed. So if we need foreign investment, communication, technology transfer, foreign products, superior genetic materials etc we should at least prepare our students to understand what is being said or what they actually want. And if we are able to gain expertise in technology, and, given the enabling environment, we shall discover that all problems of agriculture ranging from poor genetic stock to low productivity, endemic diseases to food deficits, would have been solved.

We have defined biotechnology as the application of biological science to the manipulation and use of living things for human need. Its tools are powerful; its promises are great; from the primordial application of using yeast and microbes to ferment food, brew beer and bread, it has carried its assault to the intact cell. Not waiting for the environment to change to suit the organism but actually creating the right cells and tissues to withstand the environment. Among the spectacular events and stories associated with biotechnology and genetic engineering are

* Dolly - a perfect replica of a sheep,
* Thailand scientists are now cloning an elephant,
* Creating of human organs and tissues with specific products in mind, e.g., insulin;
* Possible cloning of complete human being despite legislative block in the U.S.

For us in Nigeria these stories or their consequences need not be a bother. Our specific needs in agriculture are:

* To produce more food and reduce losses due to pests and diseases;
* Increasing resistance of high yielding modern crop varieties to pests and diseases and modifying their tolerance of harsh conditions;
* Improving crops that are recalcitrant to conventional breeding practices,
* Improving the reproduction and reproductivity of animals that have inferior genetic make up or mating difficulties;
* Shortening the generation interval of trees by tissue culture; and
* Conserving native genes and biodiversity through gene identification, screening and mapping.

Examples of some advances that have been made by ILRI with livestock in Africa are provided as follows:

1. Genetic markers: These help to identify animals that carry desirable genes without having to wait and test them - often a long and painstaking process. Breeders now can keep fewer animals and increase selection

pressure. The result is smaller, cheaper breeding programme and faster progress. This is necessary because food demand has out -paced traditional breeding methods.

2. Forage Gene Bank: Conservation of genetic resources of Napier grass and indigenous native breeds.

3. Disease diagnosis: production of antigens cheaply and efficiently without the use of animals.

4. Production of vaccines

5. Animal Breeding *Ndama vs Boran* using surrogate Boran mothers,

6. Tapping wildlife Resources.

The techniques used sound high-tech but they are simpler, cheaper, time-saving and more efficient than traditional conventional methods. Biotechnology offers tools that allow us to achieve rapid increases in productivity.

The training requirement for the B. Agric programme consist of "training the trainer" in the area of molecular biology and genetics, and adjusting the pre-specialization courses to stress molecular biology and related biochemistry principles. Laboratory exercises should be strengthened to include tissue culture and cloning of crop varieties, conservation of germplasm; semen work should progress beyond mere measurement of motilities to include test tube embryos etc. These reforms should be preceeded by a vigorous and purposeful staff training programme aimed at acquiring theoretical and practical competence in the desired areas.

ENVIRONMENT

"The teacher of a culture is its environment and agriculture is its classroom" (De Schliepper, 1956).

Environmental issues are usually tackled at the end point of the devastation caused by environmental abuse. Developed countries with large cities warn about gas emissions, ozone depletion and global warming but a more fundamental approach to environmental damage should start from fundamental consideration of the components of the ecosystem- the soil, climate, vegetation, flora and fauna. Changes in soil biology and chemistry trigger parallel changes in the vegetation and regulate the rate of plant succession. until a climax vegetation is attained within limits set by the climate. This climax vegetation remains in equilibrium until destabilizing forces usually by man, fire the first shot of environmental degradation. Thus the soil is the mother of vegetation and vegetation is the home of genetic resources or biodiversity.

From this ecological stand point it can easily be appreciated that destabilization of the soil leads directly to undermining of the vegetation which in turn leads to destruction of biodiversity and destabilization of climate. Man's activity in the nature of soil erosion, logging, overgrazing, hunting, bush burning, etc, leads directly to loss of the richest endowment of nature- its biodiversity, and eventually to desertification and drought. The tropical world is essentially a biological world, containing enormous variety of genetic resources. Because the tropical vegetation evolved under benign conditions of soil and climate, its ecosystem is rich and complex and its genetic variability infinite. This is in contrast with most temperate and sahelian environments where vegetation evolved from stressful conditions and are limited in diversity of genetic resources.

Presenting environmental issues from this perspective enables our students to appreciate the need for recycling in place of dumping, *Judicious stocking rate instead of overgrazing; grazing and forest reserves and grazing sanctuaries instead of deforestation, logging etc; fallow instead of bush burning etc.* They will better understand why students of the University of Minnesota in 1969 prevented the opening of a super market between Minneapolis and St Paul; or why Florida activists in 1975 prevented the construction of the world's largest airport in the everglades, the largest concentration of crocodiles in the world; or why Greenpeace is blocking the dumping of nuclear wastes in the oceans, the home of fishes etc.

Our curriculum should therefore emphasize the attributes of environmental purity

by drawing attention to the wastes involved in dumping and pollution. Livestock housing designs should be environment-friendly. Such slogans as ''tomorrow's feeds from today's wastes", should encourage them to search closely for areas to recycle waste and filth.

ENTREPRENEURSHIP

Back n 1988 following the tears of the Structural Adjustment Programme, the constriction of employment opportunities for our graduates, the declining enrolment of students in agriculture, and the general depression of the economy, the faculty of agriculture introduced, albeit informally, the philosophy of entrepreneurship in the orientation of our students. The argument was that if retired soldiers, medical doctors and engineers who have not had a word of agricultural instruction could open and run successful large scale poultry and pig farms, then agricultural graduate should do better, if of course, they were able to secure loans. Lecturers were therefore enjoined to give their lectures in appropriate areas an entrepreneurial twist and to emphasize it on career issues during orientations.

SUMMARY

Training of agricultural graduates for the 21st century should adopt a visionary but a realistic stance. There is need to produce the type of graduate who has acquired enough skill and competence to be a player in the global arena, who is respectful and protective about his environment and who is creative and resourceful to be self employed.

A review of the existing curriculum is called for, with specific focus on biotechnology, environmental issues and entrepreneurship.

It will require enormous funding to transform our laboratories to meet the challenges of the desired objectives but our government should realize that money invested in the empowerment of the future generation is money well spent.

REFERENCES

ILRI (1997): Livestock, People and the Environment. ILRI Nairobi, Kenya.

Obioha, F.C. (1998) Research and Development strategies for conservation and utilization of Indigenous Plants and Animals in Nigeria. Federal Ministry of Science and Technology. Workshop on biodiversity Ibadan, May, 1998.

Wagate, Robert (1990): *Miracle or Menace? Biotechnology and the Third World.*

Vision 2010 (1997): Main Report of the Vision 2010 Committee, Abuja Sept. 1997.