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**Review Article**

# Weed Science Education at the Tertiary Educational Level in Nigeria

Udensi Udensi Ekea<sup>1</sup>, Godwin-Egein Monday Ilegimokuma<sup>2</sup>, Omovbude Sunday<sup>1,\*</sup>

<sup>1</sup>Department of Crop and Soil Science, Faculty of Agriculture, University of Port Harcourt, Port Harcourt, Nigeria

<sup>2</sup>Institute of Agricultural Research and Development, University of Port Harcourt, Port Harcourt, Nigeria

**Email address:**

sundayomovbude@yahoo.com (O. Sunday)

\*Corresponding author

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**Abstract:** Weed Science is a discipline in that it deals with the study of vegetation management in agriculture, horticulture, aquatics, right-of-way, estates or amenities, essentially anywhere plants need to be managed. It involves the study of all the tools available for this purpose. In comparison with other plant protection disciplines, it has not enjoyed being a distinct discipline. Its study has in most cases been aligned with degrees in Agriculture and Agricultural related discipline. It has always been a component of degrees in Agricultural Science or Crop Science in Nigerian universities. This paper reviews the current status of Weed Science education in Nigeria. In Nigerian universities courses on weed control is part of degree programmes in Agriculture, Horticulture and/or Biological/Plant Sciences, where only aspects of weed characteristics and their control with herbicides, are taught in the third or final years. At the Masters or graduate levels it is taught where there is a Resident Weed Scientist. Because of government's insensitivity the growth and development of professionalism is stifled. To date, of 149 universities in the country, only 58 of them offer one form of a course or the other that is related to weed science, constituting 44.8%. There were no Weed Scientists present in all the categories of Polytechnics, hence limiting per capita availability of Weed Scientists in the country. This situation does not engender participation or entrant of new members into the discipline. Inadequate funding of the education and agricultural sectors has been the bane of developing adequate manpower and expertise needed in the area. For instance the Weed Science Society of Nigeria has been in existence since 1971, but their presence has not adequately influenced professionalism due to lack of appropriate policy environment. Weed Science education in Nigeria has not found its rightful space in the national polity. If national agricultural development is to remain afloat, Weed Science education should be properly appropriated through adequate budgetary allocation to the Agriculture and Education sectors. This will enhance the quality of teaching and recruitment of Weed Scientist.

**Keywords:** Weed Science, Agriculture, Education, Higher Institutions, Nigerian Universities

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## 1. Introduction

Weed Science is a discipline that deals with the study of vegetation management in agriculture, horticulture, aquatics, right-of-way, estates or amenities, essentially anywhere plants need to be managed. It involves the study of all the tools available for this purpose such as cropping systems, herbicides, and management techniques and seed genetic resources. It is not just restricted to the controlling of plants, but the study of these plants, which include their ecology, morphology, physiology, genetics etc. of plants species that

have been identified to have impact on human affairs, the economy and ecology. Weed Science in comparison with other plant protection disciplines such as Entomology, Nematology and Pathology, so to speak, has not enjoyed the reputation or space of being a separate distinct discipline. Weed Science, relative to these other disciplines, is new and has historically been considered as a component of Agronomy or Crop production. Therefore, Weed Science study or teaching has in most cases been aligned with degrees in Agriculture and Agricultural related disciplines (Plant Science and Agricultural Botany). This development has likened the status

of Weed Science relative to these other disciplines as a step child [1]. According to Zimdahl, Weed Science is multi-disciplinary in nature with topics as wide or varied as taxonomy, agricultural engineering, bio-chemistry, ecology, physiology and mathematical modeling [2], likely to feature in the curriculum. Based on this trajectory, the subject has been taught with various perceptions, however, with increasing emphasis on integrated weed biology and management and bio-economic modeling [3]. The discovery of herbicide especially, selective organic herbicides, has added another dimension to the teaching of Weed science in universities and research in institutions. Also, this brought about a synergy between universities and research institutions in weed research and teaching. Weeds and their control have always been components of the teaching that makes up the degrees of B. Sc or B. Agric in Agricultural Science or Crop Science in Universities in Nigeria. This paper reviews the current status of Weed Science higher education in Nigeria.

## 2. Status of Weed Science Higher Education in Nigeria

The current status of Weed Science teaching in most tertiary institutions in Nigeria is such that courses on weed control are part of degree programs and of those universities which offer degrees in Agriculture, Horticulture and/or Biological/Plant Sciences. Additionally, universities with Plant Science and Crop Protection related degrees only offer Weed Science related courses as taught in their curricula; such courses, in most cases, cover only the aspects of weed characteristics and their control with herbicides and are mostly available in the third or final years. The biology and ecology of the weeds are rarely taught in these programmes. Weed Science, in most Nigerian Universities, Research Institutes, Polytechnics and Colleges, is a component of Crop Science (Crop production or Agronomy and Crop

protection) education and especially in research institutes; it is either in crop management research, crop protection or improvement research. It is a discipline that can be found in Agronomy and Crop Production, Pest Management, Botany and Plant Pathology, Horticulture and Landscaping, and Plant health or Crop Protection divisions, in these institutions. In more than 50% of the time, Weed Science is globally attached to Agronomy or Crop production, because it is the first activity in crop production processes and vital component of crop management, and grading for seed or produce quality. Weed Science lectures are included in the Agronomy, Crop Production, Crop Science and Plant Science degrees at two levels (300 and 500 levels) in Nigeria, for the undergraduate programs in most universities especially those with registered Weed Scientists. At the Masters' or graduate levels it is a taught as well as research discipline, where there is a resident Weed Scientist. In universities where there is no resident weed scientist and in Crop Protection and Environmental studies, reference to weeds in relation to crops is given or made in the Integrated Pest Management module as part of both undergraduate and graduate courses with emphasis on pesticide use and application as a management option. Here the course is handled by lecturers from the Agricultural Botany or Crop Protection disciplines, and thus details of weed biology and physiology as it affects crop production are not covered, hence limiting the knowledge of the economic and social effect of weed on national development. Presented in Table 1 below is the statistics that relates to Weed Science teaching or course, research and Weed Scientist availability in Nigerian Universities, Research Institutes, Polytechnics, Colleges of Agriculture and Education. The presence of a Weed Scientist is a precedent that may inform on the existence of Weed Science education, as there will be research as well as teaching in the discipline. However, the number of Weed Scientists is staggeringly very low compared to the number of universities and colleges offering Agricultural or Agricultural related disciplines.

**Table 1.** Summary of Weed Science Presence in Nigerian Universities, Research Institutes, Polytechnics and Colleges of Agricultures and Education as at 2017.

S/N	Institution Type	Category	Estimated Number in the country	Presence of Weed Science Courses/Activities or Research	Presence of Weed Scientist
1	University	Federal	40	28 (70)	20 (71.43)
		State	44	25 (56.82)	8 (32)
		Private	65	5 (7.69)	1 (20)
		Total	149	58 (44.84)	29 (41.14)
2	Research Institutes	International	1	1(100)	1(100)
		Federal	15	10 (66.67)	8 (80)
		State	1	1(100)	0(0)
		Private	1	1 (100)	1(100)
Total	18	13 (91.67)	10 (70)		
3	Polytechnics	Federal	28	1 (3.57)	0
		State	38	3(7.89)	0
		Private	44	0 (0)	0
		Total	110	4 (3.82)	0 (0)
4	Colleges of Agriculture	Federal	8	8 (100)	2 (25)
		State	21	21(100)	4(0.9)
	Total	29	29 (100)	6 (12.95)	
	Colleges of Education	Federal	21	9 (42.86)	2(22.2)
State		46	6 (13.04)	1(16.67)	
Private		35	0 (0)	0 (0)	
Total	102	15 (18.63)	3(12.96)		

Source: Adapted from Okoli (2017) and Anonymous (2018)

Because of government's insensitivity to the growth and development of the subsectors (Agriculture, Education, Science and Technology) that oil the growth of major sectors, activities of individuals, corporate bodies or sectorial organizations and societies that facilitate the growth of professional bodies are stifled, and are incapacitated to function properly and these developments by no means discourage new entrants into the disciplines. Hence the lack of professionalism and professionals in most of these disciplines, and with the present state of events new students are not likely to embrace these fields of Agriculture. Agriculture is multi-sectorial, and for its development, all the sub-components or sectors, of which Weed Science is one, must be carried along in the agricultural development space for would be weed soldiers to admire. To date, of the 149 universities in the country irrespective of category, only about 58 of them offer one form of a course or the other that is related to weed science, categorically constituting about 44.8% on the average. Of these numbers of all categories of universities having one form of courses or the other in weeds, there is only about 40% of Weed Scientists present in them (Table 1). The presence of Weed Scientists is only felt in national agricultural research institutes, where 13 research institutes out of a total of 18 have activities in weed research, and accounts for about 70% presence of weed scientists in the country (Table 1). There was no Weed Scientists' presence in all the categories of Polytechnics found in Nigeria, meaning that no substantial training in the discipline of weed science will come from such institutions, hence limiting per capita availability of Weed Scientists in the country. For the colleges of Agriculture and Education that taught courses that are Weed Science based only about 12% of weed scientists' presence was recorded in them (Table 1). This situation is both a reflection of the level of attention given to the education, as well as, the agricultural sectors and subject component specifics of the sectors towards national development. This ugly situation does not encourage vigorous sectorial societal activities that will engender participation in or entrants of new members or would be members into the discipline. In essence professionalism in the field of Agriculture and the ancillary components have never been adequately enhanced or encouraged by successive Nigerian governments in such a way that it drives its patronage and participation.

Agricultural development processes in the country have not appropriately enhanced the development of professionalism, of both academic and non-academic, in the field of Weed Science. Inadequate funding or budgetary allocation to the education and agricultural sectors respectively has been the bane of developing adequate manpower and expertise needed in the Weed Science discipline. Nigeria as a country ranked the lowest in terms of budgetary allocation (8.4%) to education as against the UNESCO benchmark of 26% compared to other countries of the West Africa sub-region, Cote d'Ivoire and Ghana 31% each, Burkina Faso (16%); as well as other countries in Africa like Uganda (27%), South Africa 25.6% and Kenya 23% [4]. When averaged over the

years, the percentage of national budget allocated to education in the past 8 years (2010 to 2017) averaged 10%, and 2018 allocation at 7% of the national budget [9], which is grossly inadequate for any meaningful development. Similarly, budget allocations to Agriculture in Nigeria have never exceeded 2% of the National budget, which is about five times lower than the 2003 10% pledge made by the African heads of State 15 years ago, referred to as the "Maputo Declaration", to allocate 10 per cent of their national budgets to the agricultural sector. In time past government scholarships were sloped to the field of Medicine, Engineering, and other fields of studies deemed more important than Agriculture, let alone subsidiary fields of agriculture like Weed science. Governments, their agencies, private agencies and universities that promote the growth of the Agricultural sector should as a matter of urgency launch a serious campaign that will alleviate the problems of weeds in our agricultural systems, and make provisions for careers in weed science and weed research. According to Akobundu [10], the presence of organized weed research and professional training in Weed Science will compliment other components of crop production activity, so as to meet the needs of the sub-Saharan Africa in that regard. He maintained that virtually all crops including improved cultivars fall prey to weeds; hence available arable land becomes limited to that area that can be kept free of weeds.

For instance the Weed Science Society of Nigeria (WSSN) is a non-profit, non-governmental, professional, academic and scientific society, which has been in existence since 1971, but their presence has not greatly influenced professionalism in this discipline due to lack of appropriate policy environment for operation. The society is open to individuals and organizations interested or engaged in activities related to the objectives of the society, however, from its initial humble beginning in 1971 with 15 members, the society has grown to over 250 active, ordinary, student and corporate members. The Society has a Journal, the *Nigerian Journal of Weed Science* to her credit, which has been consistently published since 1988 for education and the like.

### 3. Conclusion and Recommendation

Weed Science education in Nigeria has not found the rightful space in the national polity, considering its important role in the development and growth of agriculture. If national agricultural development is to remain afloat in the face of food insecurity occasioned by climate extremes, Weed Science education should be properly appropriated through adequate budgetary allocation to the Agriculture and Education sectors. This will enable sizeable allocations available to, especially, the education sector, and this will enhance the quality of teaching and recruitment of Weed Scientists in the institutions that lack them. Opportunities for scholarship should be created, and private sector participation in the development of agricultural education in Nigeria must be encouraged. Similarly, with adequate budget to the agricultural sectors, private sector investment in agriculture in Nigeria will

improve, and the ripple effect will be the availability of jobs for various specialties in the field of Agriculture including weed scientists and weed control specialists. Private sector should be encouraged to partner with institutions to develop a model of agricultural education that should be entrepreneurial with a model that encompasses all components of productive agriculture that is agro ecology specific.

Government must as a matter of urgency partner with the Weed Science Society of Nigeria (WSSN) to have national policy on weeds, especially the noxious or resuscitate existing ones through the National Advisory Council on Weed Control (NACWC), that once made huge contributions to the control of water hyacinth in Nigeria, as well as *Striga* spp and *Imperata cylindrical* (L) Raeschel and some other noxious weeds found in Nigeria.

Agriculture and the Weed Science discipline in Nigeria is at a cross road or critical juncture with Nigeria's population swelling (estimated at 198 million people) [11], necessitating increase in food production to feed these burgeoning population. Meanwhile, the world is expected to feed an anticipated 9 billion people by the year 2050 [12], and Nigeria being a member of the world community will be directly or indirectly affected. Therefore meeting Nigeria's requirement for food and fibre crops in future and in 2050 is going to be an overwhelming task given the current level of Weed Science education and available weed management methods. With these anticipated challenges ahead, there is the need as a matter of urgency, to train the next generation of Weed Scientists with emerging trend in technology and innovation that will offer and drive the hope of providing sustainable weed management into the future.

We conclude here by saying, remember that, "No Farmer No food, and No food No Nation". However, it might be interesting to note that "in the absence of adequate weed control (Weed Scientist) there will be no food to harvest, and when there is no food, the farmer has failed (in other words, no farmer) and where there is no farmer there will be no nation.

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