Brief on the Long term DNPK experiment in Samaru northern Nigeria

The Samaru (Lat. 11^0 11'N; Long. 7^0 38'E, altitude 686 m asl) long-term DNPK (**D**ung, **N**itrogen, **P**hosphorus and **P**otassium) experiments, modelled after the classical Rothamsted Long-term Trials, was laid down in 1949. This was a time when clear signals were being received with respect to the fact that the burgeoning population, coupled with the introduction of more high yielding and nutrient-demanding crop varieties, could no longer allow farmers continue with the practice of shifting cultivation nor adapt intensive cultivation without use of external inputs. The experiment was therefore started in 1950 to compare the effectiveness of inorganic fertilizers with or without **D**ung (FYM) on soil properties, crop performance and yield under continuous cultivation. A multidisciplinary outlook was given to the experiment and other objectives now include: (i) to monitor weed growth, (ii) insect and pest incidences and (iii) to evaluate the cost and returns associated with all operations. The treatments consist of three levels of D, N, P and K applied annually in all possible combinations. It is a 3^4 singly replicated randomized complete factorial design, giving a total of 81 plots arranged in 9 blocks. Each treatment combination occupies $^1/_{45}{}^{th}$ hectare plot, with bunds separating the blocks.

Several findings have been documented since the establishment of this trial. The following are some of the publications emanating from studies that have some bearing on the DNPK plot (listed and handpicked randomly). I hope you can access some of the papers published in Journals, whereas reports of general natures and degree-based are archived in our libraries. I believe the information the experiment is providing about conditions of the larger landscape has and is still being addressed in the several studies conducted on the experiment. So are indications of the results for the future of agriculture. At 57 years, it is relatively young compared to the Rothamsted station.

1. Annual Reports presented at the Institute for Agricultural Research Cropping Scheme Meetings (1950 to date)
2. Hiikyaa, N. A. 2005. Evaluating the effects of management on soil properties and nitrogen use efficiency by maize (*Zea mays*, L) in a long-term fertility trial in the northern Guinea savanna of Nigeria. MSc Thesis submitted to the Postgraduate School, Ahmadu Bello University, Zaria-Nigeria.
3. Ogunwole, J O and Ogunleye, P O. 2004. Influence of long-term application of organic and mineral fertilizers on soil quality of a Savannah Alfisol. *J. Sustainable Agriculture* 26:6-14
4. Diels, J., Aihou, K., Iwuafor, E N O, Merckx, R, Lyasse, O, Sanginga, N., Vanlauwe, B., and Deckers, J. 2002. Options for Soil Organic carbon Maintenance under Intensive Cropping in the West African Savannah. In : Vanlauwe, B., Diels, J., Sanginga, N., and Merckx, R. (Eds.) I*ntegrated Plant Nutrient Management: From Concept to Practice.* CAB International, Wallingford, UK, pp 229-312.
5. Agbenin, J.O. and Goladi, J.T. 1997. Long-term soil fertility trend in the savannah as influenced by farmyard manure and inorganic fertiliser. IN: G. Renard, A. Neef. K. Becker and M. von Oppen (eds). *Soil Fertility Management in West Africa Land Use Systems*. Margraf Verlag, Weikershheim, Germany. Pp. 21-29.
6. Agbenin, J.O. and Goladi, J.T. 1996. Carbon, nitrogen and phosphorus dynamics under continuous cultivation as influenced by farmyard manure and

inorganic fertilizers in the savannah of northern Nigeria. *Agriculture, Ecosystems and Environment* 63:17-24.
7. Agbenin, J. O. 1996. Phosphorus sorption by three cultivated savannah Alfisols as influenced pH. *Fertilizer Research.* 44:107-112.
8. Amapu, I. Y. 1984. Effect of long-term application of DNPK on organic matter and nitrogen status. B.Sc. Agric. project (unpublished). Dept. of Soil Science, Ahmadu Bello University, Zaria-Nigeria. 105p.
9. Abdullahi, A. and Lombin, G. 1978. Long-term fertility studies at Samaru-Nigeria: II. Comparative effectiveness of separate and combined applications of mineral fertilizers and farmyard manure in maintaining soil productivity under continuous cultivation in the savannah. *Samaru Miscellaneous Paper Series No. 75*
10. Mokwunye, U. and Stockinger, K.R. 1978. Effect of farm yard manure and NPK fertilizers on crop yields and soil residual phosphorus in 24 years of cropping in Samaru. *Nigerian J. Soil Science.* 12(1&2): 169-179.
11. Baker, E.F.I, Lombin, G. and Abdullahi, A. 1977. Long-term fertility studies at Samaru-Nigeria: I. Direct and residual effects of single super phosphate and farm yard manure on yield of cotton, Sorghum and groundnuts in a rotation. *Samaru Miscellaneous Paper Series No. 67.*
12. Lombin, G. and Abdullahi, A. 1977. Long-term fertility studies at Samaru-Nigeria: II. Effect of farmyard manure on mono-cropped cotton, sorghum and groundnut and rotation of these crops under continuous cultivation, *Samaru Miscellaneous Papers number 72*.
13. Jones, M J. 1971. The maintenance of soil organic matter under continuous cultivation at Samaru, Nigeria. *J. Agric. Sci. Camb.* 77:473-482.
14. Bache, B. W. 1970. Soil phosphate in relation to phosphate supply to plants from some Nigerian soils. *J. Agric. Sci. Camb.* 74:383-390.
15. Bache, B.W. and Rogers, N.E. 1970. Soil phosphate values in relation to phosphate supply to plants from some Nigerian soils. *Soil Science* 115(4):324-325.
16. Bache, B.W. and Heathcote, R.G. 1969. Long-term effects of fertilizers and manures on soil and leaves of cotton in Nigeria. *Experimental Agriculture* 5:241-247
17. Heathcote, R.G. 1970. Soil fertility under continuous cultivation in northern Nigeria: I. The role of organic manures. *Experimental Agriculture* 6:229-237.
18. Heathcote, R. G. and Stockinger, K. R. 1970. Soil fertility under continuous cultivation in Northern Nigeria: II. Response to fertility in the absence of organic manure. *Experimental Agriculture* 6:345-350
19. Heathcote, R. G. 1969. Soil fertility under continuous cultivation in Northern Nigeria: I. The role of organic manures. *Experimental Agriculture* 6:229-237.
20. Bache, B.W. and Heathcote, R.G. 1969. Long-term effects of fertilizers and manure on soils and leaves of cotton in Nigeria. *Experimental Agriculture.* 5: 241 – 247.
21. Obi, J. K. 1959. The standard DNPK experiment Samaru Research Station Technical Report 8 Ministry of Agriculture, Northern Nigeria.

Soil and crop archives – Although the experiment was modelled after the classical Rothamsted Long-term Trials, the pioneer Scientists did not provide for the archiving of soil and crops from the DNPK experiment. Efforts to archive the soils on a yearly basis started later; some of such samples are available. No crop has been archived.