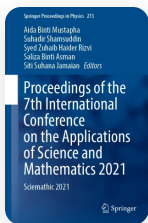


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Natural Radioactivity, Transfer Factor and Associated Radiological Risk in Commercially Cultivated Yam (*Dioscorea Rotundata*) in Northcentral Nigeria

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Abstract

Human food chain can become contaminated either by direct radionuclide deposition, absorption from radionuclide-polluted soil and water by plant roots and direct ingestion of polluted plants, soil or water by animals. In this study, activity concentrations of primordial radionuclides in soil and yam (*Dioscorea rotundata*) samples from a commercially cultivated yam farm in northcentral Nigeria were analyzed using a 3" × 3" NaI(Tl) gamma detector. Results show that mean specific activities of ^{238}U , ^{232}Th and ^{40}K in soil and yam samples were 40.36 ± 3.97 , 14.71 ± 0.80 , $385.63 \pm 16.54 \text{ Bq kg}^{-1}$, and 31.11 ± 4.00 , 11.82 ± 0.72 , $466.96 \pm 27.20 \text{ Bq kg}^{-1}$ respectively, which are within limits of safety set by the United Nations Scientific Committee on the Effect of Atomic Radiation. The average absorbed dose for soil samples was 43.63 nGy h^{-1} with corresponding mean annual effective dose of 0.05 mSv y^{-1} . Yam samples recorded mean absorbed dose rate of 42.61 nGy h^{-1} with corresponding mean annual effective dose of 0.05 mSv y^{-1} , which were within international safety limits. Computed average soil-to-yam transfer factor was 0.70, 0.83 and 1.23 respectively for ^{238}U , ^{232}Th and ^{40}K . Transfer factors for ^{238}U and ^{232}Th were below unity, while for ^{40}K was significantly moderate, showing that bioaccumulation of natural radionuclides in the Nigerian grown yam does not pose any immediate radiological threat for public consumption. The yam tubers are therefore fit, not just for consumption, but also for export to other nations from a radiological perspective. Routine radiological checks of food crops are however encouraged in compliance with the ALARA provisions.

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References

1. S. Tang, Z. Chen, H. Li, J. Zheng, Environ. Pollut. **125**(3), 305–312 (2003)

[Article](#) [Google Scholar](#)

2. A. Arogunjo, E. Ofuga, M. Afolabi, J. Environ. Radioact. **82**(1), 1–6 (2005)

[Article](#) [Google Scholar](#)

3. A.O. Gregory, E. Agbalagba, Environ. Earth Sci. **71**(4), 1541–1549 (2014)

[Article](#) [Google Scholar](#)

4. IAEA, International Atomic Energy Agency, Vienna (2010)

[Google Scholar](#)

5. N. Jibiri, I. Farai, S. Alausa, Radiat. Environ. Biophys. **46**(1), 53–59 (2007)

[Article](#) [Google Scholar](#)

6. N. Adesiji, J. Ademola, Niger. J. Pure Appl. Phys. **9**(1), 6–10 (2019)

[Article](#) [Google Scholar](#)

7. S. Uchida, K. Tagami, I. Hirai, J. Nucl. Sci. Technol. **44**(5), 779–790 (2007)

[Article](#) [Google Scholar](#)

8. S.R. Chakraborty, R. Azim, A.R. Rahman, R. Sarker, J. Phys. Sci. **24**(1), 95 (2013)

9. I.N.Y. Doyi, D.K. Essumang, A.K. Agyapong, S. Asumadu-Sarkodie, J. Environ. Radioact. **182**, 138–141 (2018)

[Article](#) [Google Scholar](#)

10. H.D. Van, T.D. Nguyen, A. Peka, M. Hegedus, A. Csordas, T. Kovacs, J. Environ. Radioact. **223**, 106416 (2020)

[Google Scholar](#)

11. R. Pérez-Escamilla, Curr. Dev. Nutr. **1**(7), e000513 (2017)

[Google Scholar](#)

12. UNSCEAR (2000)

[Google Scholar](#)

13. K. Asaduzzaman, M.U. Khandaker, Y.M. Amin, D.A. Bradley, R.H. Mahat, R.M. Nor, J. Environ. Radioact. **135**, 120–127 (2014)

[Article](#) [Google Scholar](#)

14. M.U. Khandaker, P. Jojo, H. Kassim, Y. Amin, Radiat. Prot. Dosimet. **152**(1–3), 33–37 (2012)

[Article](#) [Google Scholar](#)

15. M. Kolo, S. Aziz, M. Khandaker, K. Asaduzzaman, Y. Amin, Environ. Sci. Pollut. Res. **22**(17), 13127–13136 (2015)

[Article](#) [Google Scholar](#)

16. M.T. Kolo, M. Gomina, B. Awojoyogbe, O. Olarinoye, J. Nucl. Technol. Appl. Sci. **8**(1), 97–111 (2020)

[Article](#) [Google Scholar](#)

17. J. Beretka, P. Mathew, Health Phys. **48**(1), 87–95 (1985)

[Article](#) [Google Scholar](#)

18. U. Cevik, H. Baltas, A. Tabak, N. Damla, J. Hazard. Mater. **182**(1), 531–535 (2010)

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19. R. Ravisankar, K. Vanasundari, M. Suganya, Y. Raghu, A. Rajalakshmi, A. Chandrasekaran, S. Sivakumar, J. Chandramohan, P. Vijayagopal, B. Venkatraman, Appl. Radiat. Isot. **85**, 114–127 (2014)

[Article](#) [Google Scholar](#)

20. UNSCEAR, *Effects of Ionizing Radiation: Report to the General Assembly, with Scientific Annexes*. (United Nations Publications, 2008)

[Google Scholar](#)

21. H. Taskin, M. Karavus, P. Ay, A. Topuzoglu, S. Hidiroglu, G. Karahan, J. Environ. Radioact. **100**(1), 49–53 (2009)

22. ICRP Publication 60: 1990 Recommendations of the International Commission on Radiological Protection. (Elsevier Health Sciences, 1991)

[Google Scholar](#)

23. H.H. Azeez, H.H. Mansour, S.T. Ahmad, Appl. Radiat. Isot. **147**, 152–158 (2019)

[Article](#) [Google Scholar](#)

24. S.B. Ibikunle, A.M. Arogunjo, O.S. Ajayi, Sci. Afr. **3**, e00062 (2019)

[Google Scholar](#)

25. G. Avwiri, A. Alao, Int. J. Sci. Res. **2**(1), 468–473 (2013)

[Google Scholar](#)

26. N.N. Jibiri, B.C. Eke, Int. J. Phys. Res. Appl. **4**, 6–14 (2021)

[Article](#) [Google Scholar](#)

27. IAEA (2009)

[Google Scholar](#)

28. A.K. Ademola, Radiat. Prot. Environ. **42**(3), 112 (2019)

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