

REFERENCES

- ABUBAKAR, M. I., & OLUKOSI, J. O. (2008). Analysis of cowpea production under the national program on food security in Argungu local government area of Kebbi state. *Nigerian Journal of Basic and Applied Sciences*, 16(2), 243-247.
- ABEJIDE, D. R., FALUSI, A. O., ADEBOLA, M. O., GANA, A. S., MUHAMMAD, L. M., & GADO, A. A. (2017). Evaluation of drought tolerance of some Nigerian bambara groundnut (*Vigna subterranean*) land races. *International Journal of Applied Biological Research*, 8(2), 142-148.
- ADZAWLA, W., DONKOH, S. A., NYARKO, G., O'REILLY, P., OLAYIDE, O. E & AWAI, P. E. (2015). Technical efficiency of Bambara groundnut production in Northern Ghana. *UDS International Journal of Development*, 2(2), 37-49. <http://www.udsjed.org>
- AIGNER, D. J., LOVELL, C. A. K., & SCHMIDT, P. (1977). Formulation and estimation of stochastic frontier production functions model. *Journal of Econometrics*, 6(1), 21-37. [https://doi.org/10.1016/0304-4076\(77\)90052-5](https://doi.org/10.1016/0304-4076(77)90052-5)
- ALI, S., & KHAN, M. (2014). Technical efficiency of Wheat production in district Peshawar Pakhtunkhwa Pakistan. *Sarhad Journal of Agriculture*, 30(4), 433-441.
- AMODU, M. Y., OWOLABI, J. O., & ADEOLA, S. S. (2011). Resource use efficiency in part-time food crop production: the stochastic frontier approach. *Nigerian Journal of Basic and Applied Science*, 19(1), 102- 110
- ASRAT, P., & SIMANE, B. (2018). Farmers' perception of climate changes and adaptation strategies in the Dabus Watershed, North-West Ethiopia. *Ecological Processes*, 7(7):1 - 13. <https://doi.org/10.1186/s13717-018-0118-8>
- ATIKU, A. A. (2000). Bambara groundnut processing and storage practices in north eastern Nigeria. M.A seminar thesis. Department of Agricultural Engineering, University of Maiduguri.
- ATIKU, A. A., AVIARA, N. A., & HAGUE, M. A. (2004). Performance evaluation of a Bambara groundnut sheller. *International Commission of Agricultural Engineering*, 6(1). <https://hdl.handle.net/1813/10415>
- AZAM-ALI, S.N., AGUILLAR-MANJARREZ, J., & BANNAYAN-AVVAL, M. (2001). Global mapping system for Bambara groundnut. *FAO Agricultural Information Management series 1*, 1-47. <http://eprints.rclis.org/15746/1/A%20Global%20Mapping%20System%20for%20Bambara%20Groundnut%20Production.pdf>
- BATTESE, G.E., & COELLI, T.J. (1995). A Model for technical inefficiency effect in a stochastic Frontier production function for panel data. *Empirical economics*, 20(2), 325-332. <https://doi.org/10.1007/BF01205442>
- BERCHIE, J. N., ADU- DAPAAH, H. K., DANKYI, A. A., PLA HAR, W. A., NELSON-QUARTEY, F., HALEEGOAH, J., ASAFU-AGYEI, J. N. & ADDO, J. K. (2010). Practices and constraints in bambara groundnuts production, marketing and consumption in the Brong Ahafo and Upper-East regions of Ghana. *Journal of Agronomy*, 9(3), 111-118. [10.3923/ja.2010.111.118](https://doi.org/10.3923/ja.2010.111.118)
- CAVES, D. W., CHRISTENSEN, L. R., & DIEWERT, W. E. (1982a). The Economic Theory of index numbers and the measurement of input, output and productivity. *Econometrica*, 50(6): 1393-1414. <https://doi.org/10.2307/1913388>
- CAVES, D. W., CHRISTENSEN, L. R., & DIEWERT, W. E. (1982b). Multilateral comparisons of outputs, inputs and productivity using superlative index numbers. *The Economic Journal*, 92(365), 73-86. <https://doi.org/10.2307/2232257>
- CHARNES, A., COOPER, W. W., & RHODES, E (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2(6): 429-444. [https://doi.org/10.1016/0377-2217\(78\)90138-8](https://doi.org/10.1016/0377-2217(78)90138-8)
- COELLI, T. J. (1995). Recent development in frontier modelling and efficiency measurements. *Australian Journal of Agricultural Economics*, 39(3), 219-245. <https://doi.org/10.1111/j.1467-8489.1995.tb00552.x>
- COELLI, T. J., & RAO, D. S. P (2005). Total factor productivity growth in agriculture: A Malmquist index analysis of 93 Countries, 1980-2000. *The Journal of the International Association of Agricultural Economists*, 32(1), 115-134. <https://doi.org/10.1111/j.0169-5150.2004.00018.x>
- ANI, D. P., UMEH, J. C., & EKWE, K. C. (2013). Bambara groundnut as panacea for food security: profitability and production efficiency in Benue state, Nigeria. *ISHS Acta Horticulturae* 979: II International Symposium on Underutilized Plant Species: Crops for the Future - Beyond Food Security. <https://doi.org/10.17660/ActaHortic.2013.979.21>
- DANSI, A., VODOUHE, R., AZOKPOTA, P., YEDOMONHAN, H., ASSOGBA, H., ADJATIN, A., LOKO, Y. L., DOSSOU-AMINON, I., & AKPAGANA, K. (2012). Diversity of the neglected and underutilized crop species of importance in Benin. *The Scientific World Journal*, 2012, 932947. <https://doi.org/10.1100/2012/932947>
- EKUNWE, P. A., & EMOKARO, C. O. (2009). Technical efficiency of catfish farmers in Kaduna. *Journal of Applied Sciences Research*, 5(7), 802-805. <http://www.aensiweb.com/old/jasr/jasr/2009/802-805.pdf>
- EWUZIEM, J. E., ONYENOBI, V. O. (2012). Cost and return analysis of ginger production in the Guinea Savannah of Nigeria. *Journal of Agriculture and Food Science*, 10(2), 26-36. <http://dx.doi.org/10.4314/jafs.v10i2.3>
- FARRELL, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society*, 120(3), 253-290. <https://doi.org/10.2307/2343100>
- FOOD AND AGRICULTURE ORGANISATION (n.d). Traditional crops: bambara groundnut. <http://www.fao.org/traditional-crops/bambaragroundnut/en/>
- IBRAHIM, A. R., DANSI, A., SALIFOU, M., DUSMANE, A., ALZOUMA, A., & ALOU W (2018). Farmers' practices, utilization, conservation and

- marketing of bambara groundnut (*Vigna subterranean* (L) verdc) in Dosso Region, Western Niger. *Genetic Resources and crop evolution*, 65(7):1907-1914. <https://doi.org/10.1007/s10722-018-0664-z>
- IBRAHIN, H. D., & OGUNWUSI, A. A. (2016). Industrial potentials of Bambara nut. *Journal of Poverty, Investment and Development*, 22, 12-18. <https://iiste.org/Journals/index.php/JPID/article/view/29338>
- Knoema. n.d. Nigeria-Kaduna. *World Data Atlas*. [online]. <https://knoema.com/atlas/Nigeria/Kaduna>
- Knoema. n.d. Nigeria-Kogi. *World Data Atlas*. [online]. <https://knoema.com/atlas/Nigeria/Kogi>
- KORIR, M. K., SEREM, A. K., SULO, T. K., & KIPSAT, M. J. (2011). A stochastic frontier analysis of bambara groundnut production in western Kenya. *Congress proceedings 18th International Farm Management Congress* Methven, Canterbury, New Zealand, March 2011. <https://ifmaonline.org/contents/pr-a-stochastic-frontier-analysis-of-bambara-groundnut-production-in-western-kenya-p7480/>
- MABHAUDHI, T., & MODI, A. T. (2013). Growth, phenological and yield responses of bambara groundnut (*Vigna subterranean*) land races to imposed Water stress under field condition. *South African Journal of Plant and Soil*, 30(2), 69-79. <https://doi.org/10.1080/02571862.2013.790492>
- MAYES, S., HO, W. K., CHAI, H.H., GAO, X., KUNDY, A. C., MATEVA, K. I., ZHRULAKMAL, M., HAHIVEE, M.K.I.M., KENDABIE, P., LICEA, L. C. S., MASSAWE, F., MABHAUDHI, T., MODI, A. T., BERCHIE, J. N., AMOAH, S., FALOYE, B., ABBERTON, M., OLANIYI, O., & AZZAM-ALLI, S. N. (2019). Bambara groundnut an exemplar underutilized for resilience under climate change. *Planta*, 250(3):803-820. <https://doi.org/10.1007/s00425-019-03191-6>
- MAZAHIB, A.M., NUHA, M.O., SALAWA, I.S., & BABIKER, E.E. (2013). Some nutritional attributes of bambara groundnut as influenced by domestic processing. *International Food Research Journal*, 20(3), 1165-1171. [http://www.ifrj.upm.edu.my/20%20\(03\)%202013/18%20IFRJ%2020%20\(03\)%202013%20EIFadil%20\(4%2056\).pdf](http://www.ifrj.upm.edu.my/20%20(03)%202013/18%20IFRJ%2020%20(03)%202013%20EIFadil%20(4%2056).pdf)
- MEEUSEN, W., & VAN DEN BROECK, J. (1977). Efficiency estimation from Cobb-Douglas production function with composed error. *International Economic Review*, 18(2), 435-444. <https://doi.org/10.2307/2525757>
- MKANDAWIRE, F. L., & SIBUGA, K. P. (2002). Yield response of bambara groundnut (*Vigna subterranean*) to plant population and seedbed type. *African Crop Science Journal*, 10(1):39-50. <https://doi.org/10.4314/acsj.v10i1.27556>
- MOHAMMED, H. (2016). *Analysis of profitability and production efficiency of small scale bambara nut farming in Kajuru local government area of Kaduna state* (unpublished master's thesis). Ahmadu Bello University, Zaria, Kaduna.
- MULINGA, N. (2013). Economic analysis of factors affecting technical efficiency of smallholder maize production in Rwanda. *Rwanda Journal*, 1(1):52-62. <http://dx.doi.org/10.4314/rj.v1i1.4H>
- MUNE, M.A., MINKA, S. R., MBOME, I. L., & ETOA, F. X. (2011). Nutritional potential of bambara bean protein concentrate. *Pakistani Journal of Nutrition*, 10(2), 112-119. <http://dx.doi.org/10.3923/pjn.2011.112.119>
- MUREVANHEMA, Y. Y., & JIDEANI, V. A. (2013). Potential of bambara groundnut (*Vigna subterranean* (L) (verde) milk as a probiotic beverage. a review: critical review. *Food Science and Nutrition*, 53(9). 954-967. <https://doi.org/10.1080/10408398.2011.574803>
- MUSABA, E., & BWACHA, I. (2014). Technical efficiency of small scale maize production in Masaiti district, Zambia: a stochastic frontier approach. *Journal of Economics and Sustainable Development*, 5(4), 104-111. <https://www.iiste.org/Journals/index.php/JEDS/article/view/11272>
- NIN, A., ARNDT, C., & PRECKEL, P. V. (2003). Is agricultural productivity in developing countries really shrinking? New Evidence using a modified non-parametric approach. *Journal of Development Economics*, 71(2), 395-415. [https://doi.org/10.1016/S0304-3878\(03\)00034-8](https://doi.org/10.1016/S0304-3878(03)00034-8)
- NJERU, J. (2010). Factors influencing technical efficiencies among selected wheat farmers in Uasin Gishu districts Kenya. *African Economic Research Consortium (AERC)*. Research Paper. <https://core.ac.uk/download/pdf/6476029.pdf>
- NJI, F. F., NIESS, E., & PFEFFER, E. (2003). Effect of raw and heat treated bambara groundnut (*Vigna subterranean*) on the performance and body composition of growing broiler chicks. *Arch Tierernahr*, 57(6):443-453. DOI: <https://doi.org/10.1080/0003942032000161081>
- NJI, F. F., NIESS, E., & PFEFFER, E. (2004). Nutrient content of Bambara groundnut (*Vigna subterranean*) and the effect of its inclusion on the performance of growing broiler chicken and on egg production and quality. *Journal of Animal and Feed Science*, 13(3), 497-507. <https://doi.org/10.22358/jafs/67619/2004>
- NKAMIGBO, D. C., OVUOMARIE, O. S., MADUKA, J. U., & ISIBOR, A. C. (2014). Economic efficiency and profitability of Catfish (*Clarias gariepinus*) Production in Isoko area of Delta State, Nigeria. *Journal of Agriculture and Veterinary Sciences*, 6(2), 32-40
- NURUDEEN, S., & RASAKI, K. (2011). Technical efficiency of Cowpea production in Osun State. *Nigeria Journal of National Science Research*, 1(2), 29-34. <https://iiste.org/Journals/index.php/JNSR/article/view/817>
- NWARU, J. C., & NDUKWU, P. C. (2011). Estimation of farm level of technical efficiency and its determinants among male and female sweet potatoes farmers in Imo State, Nigeria. *Ethiopian Journal of Economics*, 20 (1), 99-112. <https://www.ajol.info/index.php/eje/article/view/82968>

- OGUNDARI, K., & OJO, S.O. (2007). Economic efficiency of small scale food crop production in Nigeria: a stochastic frontier approach. *Journal of Social Sciences*, 14(2), 123-130. <https://doi.org/10.1080/09718923.2007.11978363>
- OGUNDARI, K. (2008). Resource productivity, allocative efficiency and determinants of technical efficiency of rainfed rice farmers: A guide for food security policy in Nigeria. *Agricultural Economics*, 54(5), 224-233. <https://doi.org/10.17221/246-AGRICECON>
- OHAIJANYA, D. O., & ONYENWEAKU, C. E. (2003). Analysis of cost and returns in rice farming by farm size in Ebonyi State. *Journal and Agriculture and Social Research*, 3(1), 29-39. <https://doi.org/10.4314/jasr.v3i1.2784>
- ONUICHE, U., ALI, S. O., & ISAAC, J. T. (2015). Technical Efficiency Estimates and the role of Formal Education: Evidence from Catfish farms in Ijumu Local Government Area of Kogi state, north central, Nigeria. *Agrosearch*, 15(2), 107 – 117. <https://doi.org/10.4314/agrosh.v15i2.9>
- OYINBO, O., ADAH. I. D., & REKWOT, G. Z. (2015). Technical efficiency-food security nexus in Kaduna state, Nigeria: a case study of poultry egg farmers. *Consilience: The Journal of Sustainable Development*, 14, 244-259. <https://www.jstor.org/stable/26188754>
- SCHULTZ, T. W. (1964). *Transforming Traditional Agriculture*. Chicago. University of Chicago press.
- SEGUN-OLASAMI, A. O., & BAMIRE, A. S. (2010). Analysis of Cost and returns to Maize-Cowpea intercrop production in Oyo State, Nigeria. Paper presented at the *Joint 3rd African Association of Agricultural Economics (AAAE) and 48th Agricultural Economic Association of South Africa (AEASA) conference*, Cape Town, South Africa September 19-23, 2010.
- SIMONYAN, J. B., OLUKOSI, J. O., OMOLEHIN, R. A. & ATALA, T. K. A. (2012). Productivity and technical efficiency among beneficiary farmers of second National Fadama Project in Kaduna State, Nigeria. *American Journal of Experimental Agriculture*, 2(1), 102-110. <https://doi.org/10.9734/AJEA/2012/854>
- TWENEBOAH, C. K. (2000). *Modern Agriculture In the tropics*. Food crops. Co-wood publishers.
- YAKUBU, H., KWARI, J. D., & SANDABE, M. K. (2010). Effect of phosphorus fertilizer on nitrogen fixation by some grain legumes variety in Sudano-Sahelian Zone of Northeastern Nigeria. *Nigerian Journal of Basic and Applied Sciences*, 18(1), 19-26. <https://doi.org/10.4314/njbas.v18i1.56837>
- YAMAGUCHI, M. (1983). *World Vegetables: Principles, Production and Nutritive values*. Molecular Nutrition, 28, 1028. <https://doi.org/10.1007/978-94-011-7907-2>