FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 10 No. 23, December, 2026, pp 296 – 303
DOI: https://doi.org/10.33003/fjs-2026-1023-6351

GIS-Based Multi-criteria Assessment of Land Suitability for White Yam (Dioscorea Rotundata) Cultivation IN Irepodun LGA, Kwara State, Nigeria

[1]Perpetua Nkeiruka Oby Iyere-Usiahon, [2]Olumuyiwa James Jayeoba and [1]Chika Josephine Nzekwu

[1]Federal Ministry of Agriculture and Food Security, Area 11, Garki, Abuja 900211, Nigeria.
[2]Department of Agronomy, Faculty of Agriculture, Nasarawa State University, Keffi 961101, Nigeria.

*Corresponding authors' email: perhon2011@yahoo.com

ABSTRACT
Spatial land suitability evaluation is crucial for matching crop requirements to land qualities in sub-Saharan Africa. This study assessed land suitability for white yam (*Dioscorea rotundata*) in Irepodun LGA, Kwara State, Nigeria (737 km²), using a GIS-based, Coefficient of Variation (CV)-informed weighted overlay framework. Twenty-five topsoil samples (0–30 cm) were collected between May and June 2024; subsoil observations at 10 profile pits confirmed effective depth (>100 cm) and drainage. Soil pH averaged 6.07 ± 0.45, with 18 sites in the optimal S1 range (5.5–6.5) and seven in S2. Textures were predominantly medium (10 sandy clay loam, 6 sandy loam, 7 loamy sand, 2 clay). Total nitrogen (0.09 ± 0.02%), organic matter (1.74 ± 0.57%), cation exchange capacity (CEC; 8.15 ± 2.64 cmol(+) kg^{-1}), and exchangeable potassium (median 130 mg kg^{-1}) were low, identifying inherent fertility as the principal constraint. Ordinary kriging (exponential variogram) generated raster surfaces (cross-validation for organic matter: R^2 = 0.78, RMSE = 0.42). The weighted overlay classified the area into three biophysical classes: Moderately Suitable (S2) dominated at 582.2 km² (79.00%); Marginally Suitable (S3) covered 136.3 km² (18.50%) due to light textures and slopes (8–15%); and Highly Suitable (S1) was restricted to 18.5 km² (2.50%). Legally protected forest reserves (34.5 km²) were masked out. A 1% shift in organic matter and CEC weights produced an 8.4% class boundary realignment. Integrated soil fertility management, split fertilizer application, and erosion control on S3 land are recommended.

Received: 28 Sept. 2026
Accepted: 11 Nov. 2026
Published: 17 Nov. 2026

Keywords: Convergence Insufficiency, Near Point Of Convergence, Positive Fusional Vergence, Convergence Insufficiency Symptom Survey, Undergraduate Students, Near Work

INTRODUCTION

White yam (Dioscorea rotundata Poir.) is a major staple and cash crop in West Africa, underpinning household food security, rural livelihoods, and socio-cultural traditions (Ayegbusi et al., 2026; Igbawua et al., 2022). Nigeria is the world's leading producer, accounting for approximately 67% of global annual output, with cultivation concentrated in the Guinea and derived savanna belts (FAO, 2023; Igbawua et al., 2022). Despite its economic importance, average smallholder yields in Nigeria (10–12 t ha^{-1}) remain well below potential research-station yields (25–30 t ha^{-1}) (Obidiegwu et al., 2015). This yield gap is largely driven by severe soil nutrient depletion, shortened fallow cycles, continuous tuber cropping without adequate replenishment, and unguided land-use expansion (Chiaka et al., 2024; Lal, 2015).

Soils formed over Precambrian Basement Complex rocks in the Southern Guinea Savanna of Nigeria are characteristically weathered, coarse-textured, and low in organic carbon, total nitrogen, and cation exchange capacity (CEC) (Esu, 2022; Raji and Alagbe, 2020). These edaphic constraints are agronomically critical for D. rotundata, an exhaustive nutrient feeder with heavy requirements for nitrogen (for early canopy development) and potassium (for tuber bulking and starch translocation) (Ohiri and Nwokoye, 1984; Olatunji et al., 2012). Generalized fertilizer recommendations fail to account for fine-scale edaphic variability, resulting in low nutrient-use efficiency (Ande, 2011; Osujieke et al., 2026). Geospatially explicit land evaluation offers a robust framework for matching specific crop requirements with observed land qualities (Peter et al., 2019; Sys et al., 1993).

Multi-Criteria Decision Analysis (MCDA) integrated within GIS environments has emerged as a decision-support tool for spatial suitability modeling (Choudhary et al., 2023; Malczewski, 2006). While classical Analytic Hierarchy Process (AHP) relies on subjective expert pairwise comparison matrices, data-driven weighting frameworks based on spatial Coefficient of Variation (CV) provide an objective measure of the discriminating power of environmental criteria (Morales and de Vries, 2021; Nungula et al., 2024). Previous GIS-based suitability evaluations in Kwara State have focused on cassava (Ajala et al., 2020) or broad multi-crop assessments. Local government-scale evaluations linking measured edaphic variability, geostatistical interpolation metrics, and terrain constraints to explicit FAO suitability classes for white yam in Irepodun LGA are lacking. This study therefore aimed to evaluate biophysical land suitability for white yam production in Irepodun LGA by quantifying soil physicochemical properties, interpolating continuous raster surfaces via ordinary kriging, applying a CV-informed weighted overlay model, and mapping legal land-use masks alongside biophysical suitability classes.

MATERIALS AND METHODS

Study Area

Irepodun Local Government Area is located in south-central Kwara State, Nigeria (Latitude 8°25′00″ N to 8°35′00″ N, Longitude 4°45′00″ E to 5°12′00″ E), covering approximately 737 km², with its administrative headquarters at Omu-Aran. The area falls within the Southern Guinea Savanna agro-

ecological zone and experiences a tropical wet-and-dry climate (Köppen Aw). Mean annual rainfall ranges from 1,200 to 1,400 mm across a unimodal rainy season (April to October), while mean annual temperatures range between 25 °C and 29 °C (Jimoh et al., 2022). The underlying geology is dominated by Precambrian Basement Complex crystalline rocks, giving rise to Alfisols, Ultisols, and Inceptisols (USDA Soil Taxonomy), corresponding to Luvisols, Acrisols, and Cambisols (FAO/WRB) (Esu, 2022; Raji and Alagbe, 2020). Topography ranges from undulating plains (slope 1–5%) to isolated inselbergs reaching 300–550 m above sea level. Agricultural land use is dominated by smallholder farming systems featuring white yam, cassava, maize, sorghum, and cashew. Figure 1 is the map of the study area.

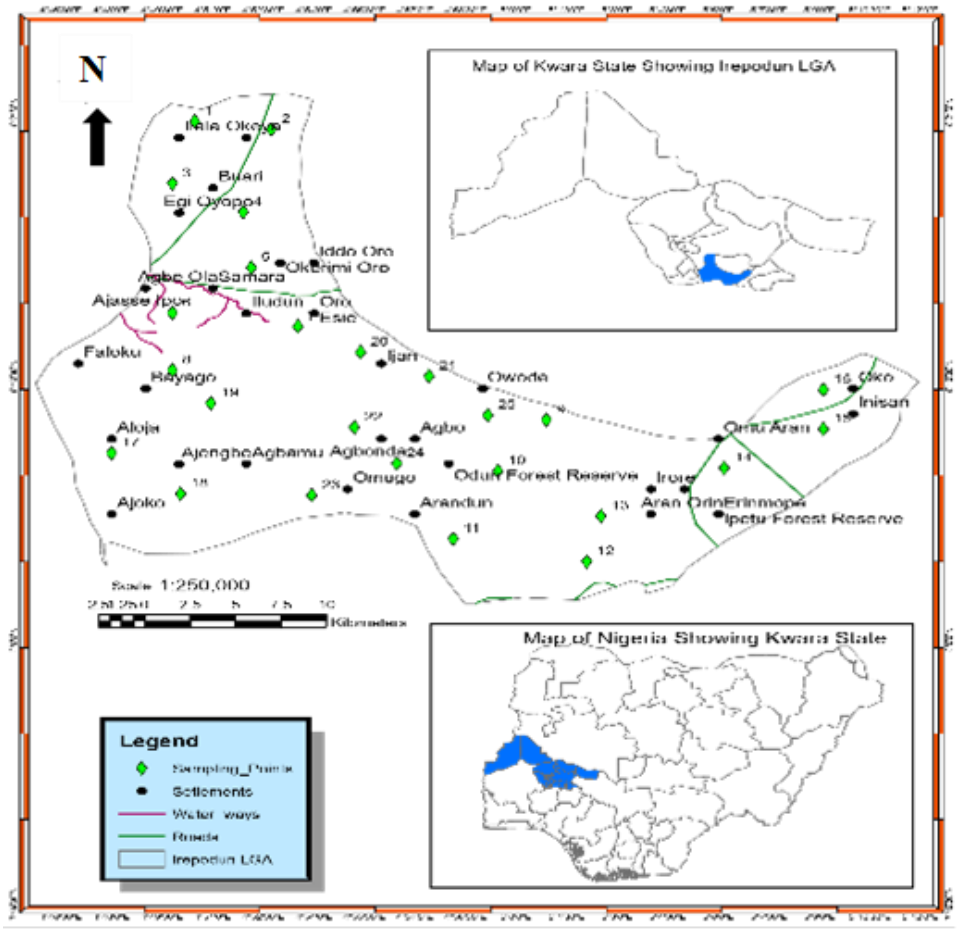


Figure 1: Map of Irepodun Local Government Area Showing Sampling Points

Sampling Design, Soil Sampling, and Laboratory Analysis

A stratified random sampling design was employed based on intersecting geological units, land-use/land-cover classes, and topographic positions. Between January and February 2025, twenty-five (N = 25) topsoil samples (0–30 cm depth) were collected using a stainless-steel Dutch auger. Coordinates were recorded using a handheld GPS receiver (Garmin GPSMAP 64s, accuracy ±3 m). A sampling depth of 0 – 30 cm soil depth was chosen because preliminary field observations at 10 representative profile pits across the study area confirmed an effective rooting depth exceeding 100cm and favorable internal drainage conditions.

Soil samples were air-dried, gently crushed, and passed through a 2 mm sieve. Analytical procedures followed standard protocols (Esu, 2022): particle size distribution by the Bouyoucos hydrometer method; pH in a 1:2.5 soil-to-water suspension; organic carbon by Walkley–Black wet oxidation (organic matter = organic carbon × 1.724); total nitrogen by micro-Kjeldahl digestion; available phosphorus by Bray-1 extraction and ascorbic acid colorimetry; and exchangeable bases and CEC by neutral 1 M ammonium acetate leaching (pH 7.0). K^+ and Na^+ were measured by flame photometry, while Ca^{2+} and Mg^{2+} were determined by atomic absorption spectrophotometry. Cation concentrations were converted to cmol(+) kg^{-1} using standard equivalent weights (K^+: 391; Ca^{2+}: 200; Mg^{2+}: 122). Analytical quality control included internal standard reference materials, reagent blanks, and 10% duplicate analyses (replicate error <5%).

Spatial Data Processing and Geostatistical Interpolation

Geospatial datasets were projected to UTM Zone 31N, WGS 84 at a spatial resolution of 30 m × 30 m in QGIS (v3.34) and ArcGIS Pro (v3.2). Slope gradient and Topographic Wetness Index were derived from a 30 m SRTM Digital Elevation Model. Land use/land cover was classified from Landsat 9 OLI imagery (acquired 15 January 2024; Path 190, Row 54) using maximum-likelihood supervised classification, validated against 80 ground-truthed GPS points (overall accuracy = 88.75%, Kappa = 0.86) (Congalton and Green, 2019). Rainfall surfaces (1994–2023) were generated from CHIRPS data calibrated with NiMet records. Legal boundaries for the Odun and Ipetu Forest Reserves were digitized from Kwara State Ministry of Environment survey records and applied as an exclusion mask.

Point laboratory data were interpolated to continuous raster surfaces using ordinary kriging with an exponential

variogram model. Cross-validation for soil organic matter yielded (R^2 = 0.78) and RMSE = 0.42.

Suitability Framework and Criteria Thresholds

Evaluation criteria and thresholds were established based on FAO land evaluation principles (Sys et al., 1993) and eco-physiological requirements for white yam (Ohiri and Nwokoye, 1984). Land qualities were categorized into four FAO classes: Highly Suitable (S1), Moderately Suitable (S2), Marginally Suitable (S3), and Not Suitable (N) (Table 1). Threshold ranges were defined exhaustively to eliminate class gaps.

Table 1: Land Suitability Rating Framework and Criteria Thresholds for White Yam (*Dioscorea rotundata*) Cultivation

Land Quality / Parameter	S1: Highly Suitable	S2: Moderately Suitable	S3: Marginally Suitable	N: Not Suitable
Soil Depth (cm)	> 100	50 – 100	20 – <50	< 20
Soil Texture	Sandy loam, Loam, Silt loam	Sandy clay loam, Loamy sand	Heavy clay, Sand, Gravelly loam	Compacted heavy clay, Pure sand
Soil Reaction (pH)	5.5 – 6.5	5.0 – <5.5 or >6.5 – 7.0	4.5 – <5.0 or >7.0 – 7.5	< 4.5 or > 7.5
Drainage Class	Well-drained	Moderately well-drained	Imperfectly drained	Poorly to very poorly drained
Slope Gradient (%)	0 – 3	>3 – 8	>8 – 15	> 15
Organic Matter (%)	> 2.5	1.5 – 2.5	0.5 – <1.5	< 0.5
CEC (cmol(+) kg^{-1})	> 15	10 – 15	5 – <10	< 5
Mean Annual Rainfall (mm)	1,200 – 1,800	900 – <1,200 or >1,800 – 2,500	600 – <900 or >2,500 – 3,000	<600 or >3,000
Mean Annual Temp (°C)	25 – 30	22 – <25 or >30 – 32	20 – <22 or >32 – 35	<20 or >35

Source: Sys et al. (1993)

CV-Informed Weighting Framework and Mathematical Formulation

To eliminate the subjective bias inherent in manual AHP pairwise scoring while maintaining mathematical consistency, criterion weights (wi) were derived from the spatial Coefficient of Variation (CV) of the measured properties (Morales and de Vries, 2021). The relative variability of each parameter dictates its spatial discriminating power. Because weights are derived deterministically from measured CVs, no subjective pairwise comparison matrix is required; the procedure is described as a CV-informed weighted overlay, and no consistency ratio is reported (Malczewski, 2006).

Table 2: Data-derived Criterion Weights and Spatial Variability

Criterion	Weight (*wi*)	Parameter CV (%)	Rationale / Discriminating Power
Organic Matter	0.308	32.85	Highest measured spatial variability (0.8–2.9%)
CEC	0.304	32.45	High spatial variability across Basement Complex soils
Soil Texture	0.169	18.00	Moderate dispersion in textural suitability scores
Soil Reaction (pH)	0.069	7.35	Low spatial variability (most sites near optimal pH)
Slope Gradient	0.050	—	Localized topographic constraint in elevated patches
Effective Soil Depth	0.040	—	Uniformly deep (>100 cm) at profile pits
Drainage Class	0.030	—	Predominantly well to moderately well drained
Mean Annual Rainfall	0.020	—	Uniform macro-climate across 737 km²
Mean Annual Temperature	0.010	—	Uniform macro-climate across 737 km²
Total	1.000	—	—

The Land Suitability Index (LSI) for each raster cell was calculated via Weighted Linear Combination:

$LSI = \sum_{i=1}^{m} wi \,.\, Si$

where *wi* is the normalized weight of criterion *i* ($\sum wi=1.0$), *Si* is the reclassified score (S1=4, S2=3, S3=2, N=1), and *m* is the total number of criteria (=9). Continuous LSI raster values were reclassified into FAO suitability classes using defined cut-offs: LSI ≥3.50 →S1→S1; 2.75≤ LSI <3.50→S22.75≤LSI< 3.50→S2; 2.00 ≤ LSI< 2.75 → S3; and LSI<2.00 →N. Weight sensitivity was tested by perturbing organic matter and CEC weights in 1% increments to evaluate class boundary realignment.

RESULTS AND DISCUSSION

Soil Physicochemical Characterization

Soil reaction (pH in H_2O) ranged from 5.3 to 6.8 with a mean of 6.07 ± 0.45. Eighteen sites fell within the S1 optimal range (5.5–6.5); six sites (pH 6.6–6.8) and one site (pH 5.3) fell into the S2 class. Medium-textured soils predominated: 10 sandy clay loam, 6 sandy loam, 7 loamy sand, and 2 clay (total N = 25). Summary statistics are presented in Table 3 while the Georeferenced Field Sampling Points and Topsoil (0–30 cm) Soil Properties in Irepodun LGA.

Table 3: Summary Statistics of Topsoil (0–30 cm) Properties Across 25 Sampling Points

Property	Unit	Mean ± SD	Range
pH (H_2O)	—	6.07 ± 0.45	5.3 – 6.8
Available P	mg kg^{-1}	10.8 ± 2.8	6.0 – 18.2
Exchangeable K	cmol(+) kg^{-1}	Median: 0.33; Mean: 0.29*	< 0.10 – 0.64
Exchangeable Ca	cmol(+) kg^{-1}	4.74 ± 1.70	2.00 – 7.99
Exchangeable Mg	cmol(+) kg^{-1}	1.46 ± 0.52	0.58 – 2.39
CEC	cmol(+) kg^{-1}	8.15 ± 2.64	3.5 – 13.2
Total N	%	0.09 ± 0.02	< 0.04 – 0.13
Organic Matter	%	1.74 ± 0.57	0.8 – 2.9
C/N Ratio	—	11.39 ± 2.48	8.0 – 17.2

* Exchangeable K is Reported using Median and Mean Because Six Samples Fell Below the Detection Limit (<40 mg kg^{-1}, Equivalent to <0.10 cmol(+) kg^{-1}). Censored Values were set to 20 mg kg^{-1} (Half the Detection Limit) for the Mean Calculation only

Soil pH was favorable across most locations, enhancing nutrient solubility without inducing aluminum toxicity, thus eliminating the immediate need for liming. Conversely, total N and organic matter were low, falling predominantly into S2 and S3 rating classes. Mean CEC (8.15 cmol(+) kg^{-1}) reflects low inherent nutrient retention, characteristic of kaolinite-rich Basement Complex Alfisols (Raji and Alagbe, 2020). Exchangeable K was below 0.25 cmol(+) kg^{-1} at 9 coarse-textured sites and severely deficient (<0.15 cmol(+) kg^{-1}) at 4 sites. The C/N ratio of 11.39 indicates satisfactory microbial mineralization capacity where organic inputs are supplied. Textural distribution correlated with fertility: loamy sands recorded the lowest CEC (3.50–6.40 cmol(+) kg^{-1}) and K, whereas sandy clay loams and clays exhibited higher CEC (8.40–13.20 cmol(+) kg^{-1}).

Quantitative Extent and Spatial Distribution of Suitability Classes

Weighted overlay modeling categorized the 737 km^2 area into three biophysical suitability classes (Table 4; Figure 2). No portion of the LGA was mapped as Not Suitable (N).

Table 4: Quantitative Extents and Spatial Distribution of White Yam Land Suitability Classes

Suitability Class	Description / Agronomic Constraints	Area (km^2)	Area (%)	Principal Locations
S1 (Highly Suitable)	Minimal biophysical constraints; deep, well-drained medium textures on gentle slopes (<3%).	18.5	2.50	Restricted southern sector near Arandun.
S2 (Moderately Suitable)	Moderate fertility constraints (low N, OM, K); medium textures; responsive to management.	582.2	79.00	Dominant across LGA: Ilala Okeya, Buari, Iddo Oro, Esie, Owode, Arandun.
S3 (Marginally Suitable)	Severe limitations from coarse textures (loamy sands), low CEC, steep slopes (8–15%).	136.3	18.50	Ajasse Ipo, Agbe OlaSamara, Ajengbe, Omu-Aran, Erinmope.
N (Not Suitable)	Extreme physical or chemical constraints.	0.0	0.00	None mapped biophysically.
Total	—	**737.0**	**100.00**	Entire LGA boundary
(Forest Reserves)	Legally protected areas excluded from cultivation (Odun: 21.2 km^2; Ipetu: 13.3 km^2).	(34.5)	(4.68)	Eastern sector (masked out).

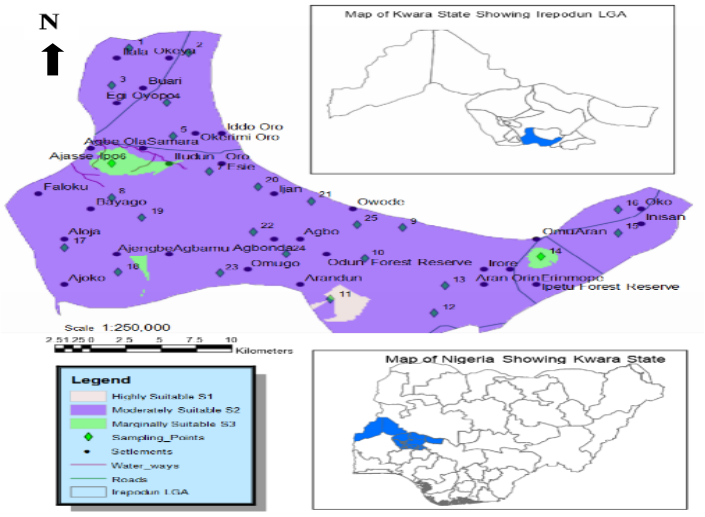


Figure 2: Map of Irepodun Showing Three Biophysical Suitability Classes

Sensitivity analysis revealed that a 1% shift in organic matter and CEC weights produced an 8.4% realignment of class boundaries, primarily along the S2/S3 margin. However, the S1 core near Arandun and the S3 core around Ajasse Ipo remained stable, indicating that the central conclusions are robust to plausible weight perturbations.

Interpretation and Comparison with Previous Studies

Climate and topography are broadly favorable for yam in Irepodun LGA, with edaphic factors constituting the principal constraints (low N, OM, modest CEC, and localized K deficiency). This pattern is consistent with earlier characterizations of Basement Complex soils (Esu, 2022; Raji and Alagbe, 2020) and reflects the nutritional demands of D. rotundata during tuber bulking (Ohiri and Nwokoye, 1984; Olatunji et al., 2012). The spatial pattern represents a texture- and fertility-driven gradient. Coarse loamy sands in S3 units exhibit low CEC and high macroporosity, causing rapid leaching. Heavy clay patches impose mechanical impedance to tuber expansion. Conversely, sandy clay loam and sandy loam textures dominating S2 and S1 areas provide a balance between moisture retention, aeration, and root penetration. These findings corroborate national-scale assessments by Igbawua et al. (2022) and Kwara State studies by Ajala et al. (2020), which established that savanna Alfisols are moderately suitable for root crops but require sustained nutrient management.

Management Implications

Because soil nutrient availability is the main constraint across S2 and S3 lands, targeted agronomic management is required. First, Integrated Soil Fertility Management (ISFM) should combine organic amendments (poultry manure or compost at 5–10 t ha^{-1}) with balanced N–P–K fertilizers enriched with potassium (e.g., NPK 15-15-20). Second, on coarse-textured S3 loamy sands, N and K fertilizers should be applied in split doses (at 4, 8, and 12 weeks post-emergence) to minimize leaching. Third, on steeper S3 slopes (8–15%), contour ridges, leguminous cover crops (Mucuna pruriens), and organic mulching should be deployed to suppress erosion. Fourth, extension agencies should utilize the 30 m spatial suitability output for site-specific recommendations, while land-use policies must protect S1 and S2 lands from residential encroachment.

Study Limitations

Interpolating 25 sampling points over 737 km^2 smooths micro-scale variability; outputs are indicative at the LGA scale. Soil depth and drainage were evaluated at discrete profile pits rather than mapped continuously, introducing spatial uncertainty. Finally, this evaluation models biophysical suitability only; socio-economic factors (market access, labor, tenure) were not integrated.

CONCLUSION

This study integrated soil laboratory analysis, geostatistical kriging, and a CV-informed weighted overlay model within a GIS environment to evaluate land suitability for white yam in Irepodun LGA, Kwara State. Climate and topography are favorable, with soil reaction (mean pH 6.07 ± 0.45) falling within optimal ranges. Inherent soil fertility represents the main constraint: total N (mean 0.09%), organic matter (mean 1.74%), CEC (mean 8.15 cmol(+) kg^{-1}), and K reserves are low. Biophysical suitability modeling classified 582.2 km^2 (79.00%) as Moderately Suitable (S2), 136.3 km^2 (18.50%) as Marginally Suitable (S3), and 18.5 km^2 (2.50%) as Highly Suitable (S1). No land was classified as Not Suitable. Protected forest reserves (34.5 km^2) were excluded. The integration of GIS and objective weighting captured edaphic variability, establishing a quantitative baseline for agricultural planning in Kwara State. Future research should expand sampling density, perform multi-season yield validation trials, and incorporate socio-economic datasets.

RECOMMENDATIONS

1. Integrated Soil Fertility Management (ISFM): Smallholder farmers in S2 and S3 zones should adopt combined applications of farmyard manure or poultry manure (5–10 t ha^{-1}) with balanced N–P–K inorganic fertilizers (e.g., 90– 60–60 kg ha^{-1} of N–P_2O_5–K_2O) to address acute nitrogen and potassium deficits.
2. Soil Conservation Practices: On S3 slopes (8–15%) around Ajasse Ipo and Omu-Aran, contour ridging, mulching, and alley cropping with leguminous species (e.g., *Mucuna pruriens*) should be implemented to minimize soil erosion and organic matter loss.
3. Precision Extension Services: Kwara State Agricultural Development Programme (KWADP) should utilize the generated suitability maps to guide targeted extension advice rather than uniform state-wide input distribution.

ACKNOWLEDGEMENTS

The authors express their gratitude to the Department of Land and Climate Change Services for field technical support and to the Nigerian Meteorological Agency (NiMet) for providing long-term climatic records.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

FUNDING

This research received no specific grant from any funding agency.

DATA AVAILABILITY

The complete georeferenced topsoil dataset is provided as Supplementary Table S1. GIS raster layers and variogram parameters are available from the corresponding author upon reasonable request.

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ANNEX: SUPPLEMENTARY DATA

Supplementary Table S1: Georeferenced Field Sampling Points and Topsoil (0–30 cm) Soil Properties in Irepodun LGA

Location / Mapping Unit	Latitude (°N)	Longitude (°E)	Depth / Drainage	pH (H_2O)	Organic Matter (%)	Total N (%)	Avail. P (mg kg−1)	Exch. K (cmol(+)kg−1)	Exch. Ca (cmol(+)kg−1)	Exch. Mg (cmol(+)kg−1)	CEC (cmol(+)kg−1)	Soil Texture Class
Ilala Okeya	8.3412	4.8821	>100cm / Well	6.2	1.85	0.09	12.4	0.32	4.80	1.50	8.20	Sandy Clay Loam
Ilala Okeya East	8.3485	4.**9012**	>100cm / Well	6.4	2.10	0.11	14.1	0.38	5.20	1.65	9.10	Loamy Sand
Buari	8.3120	4.8410	>100cm / Well	5.8	1.45	0.07	9.8	0.22	3.90	1.20	6.80	Sandy Clay Loam
Egi Oyopo	8.2954	4.8621	>100cm / Well	6.1	1.60	0.08	10.5	0.28	4.40	1.35	7.50	Sandy Loam
Iddo Oro	8.2711	4.9125	>100cm / Well	6.0	1.75	0.09	11.2	0.30	4.60	1.40	8.00	Clay
Ajasse Ipo North	8.2410	4.8102	>100cm / Well	5.3	0.95	0.05	6.8	0.12	2.40	0.75	4.20	Sandy Clay Loam

Location / Mapping Unit	Latitude (°N)	Longitude (°E)	Depth / Drainage	pH (H_2O)	Organic Matter (%)	Total N (%)	Avail. P (mg kg−1)	Exch. K (cmol(+)kg−1)	Exch. Ca (cmol(+)kg−1)	Exch. Mg (cmol(+)kg−1)	CEC (cmol(+)kg−1)	Soil Texture Class
Esie	8.2301	4.9110	>100cm / Well	6.5	2.40	0.12	15.8	0.45	6.10	1.90	10.50	Sandy Clay Loam
Bayago	8.1921	4.8015	>100cm / Well	5.9	1.30	0.07	8.5	0.18	3.60	1.10	6.10	Loamy Sand
Owode East	8.1890	4.9821	>100cm / Well	6.3	1.90	0.10	13.0	0.35	5.00	1.55	8.80	Sandy Loam
Odun Boundary	8.1512	4.9510	>100cm / Well	6.1	1.80	0.09	11.8	0.31	4.70	1.45	8.10	Sandy Loam
Arandun South	8.1025	4.9150	>100cm / Well	6.6	2.90	0.13	18.2	0.64	7.99	2.39	13.20	Loamy Sand
Arandun Southeast	8.0811	4.9512	>100cm / Well	6.5	2.65	0.12	16.5	0.52	7.10	2.10	11.80	Sandy Clay Loam
Aran Orin	8.1150	4.9921	>100cm / Well	6.2	1.95	0.10	12.8	0.34	5.10	1.60	8.90	Sandy Loam
Omu-Aran West	8.1412	5.0810	>100cm / Well	5.6	1.10	0.06	7.2	0.14	2.90	0.90	4.90	Sandy Clay Loam
Inisan	8.1810	5.1412	>100cm / Well	6.0	1.55	0.08	9.5	0.25	4.20	1.30	7.10	Sandy Clay Loam
Oko	8.2105	5.1320	>100cm / Well	6.1	1.70	0.09	10.9	0.29	4.50	1.40	7.80	Loamy Sand
Aloja	8.1510	4.7712	>100cm / Well	5.7	1.25	0.06	8.0	0.16	3.20	1.00	5.40	Sandy Loam
Ajoko	8.1201	4.8010	>100cm / Well	6.2	1.85	0.09	12.1	0.33	4.90	1.50	8.40	Sandy Clay Loam
Faloku East	8.1812	4.8320	>100cm / Well	6.0	1.65	0.08	10.2	0.27	4.30	1.35	7.40	Sandy Clay Loam
Ijan	8.2410	4.9350	>100cm / Well	6.4	2.20	0.11	14.5	0.40	5.50	1.70	9.60	Loamy Sand
Owode North	8.2250	4.9510	>100cm / Well	6.3	2.00	0.10	13.2	0.36	5.20	1.60	9.00	Sandy Clay Loam
Agbo	8.1650	4.8912	>100cm / Well	5.8	1.40	0.07	9.1	0.20	3.70	1.15	6.30	Sandy Loam
Omugo	8.1102	4.8620	>100cm / Well	6.1	1.75	0.09	11.5	0.30	4.60	1.40	7.90	Clay
Agbonda	8.1410	4.9102	>100cm / Well	6.3	2.05	0.10	13.8	0.37	5.30	1.65	9.20	Sandy Clay Loam
Owode South	8.1950	4.9620	>100cm / Well	6.7	2.80	0.13	17.5	0.58	7.50	2.25	12.50	Clay

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