

## **SPATIAL AND ECONOMIC ANALYSIS OF POTENTIAL AGRICULTURAL LAND AND ITS INFLUENCE ON THE RUPIAH EXCHANGE RATE AGAINST USD: A LITERATURE REVIEW**

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### **ABSTRACT**

The food crisis has become a global issue for countries. According to Law No.18/2012, rice is an important commodity that must be maintained to ensure food availability for consumption fulfilment. Rice trade performance analysis, Indonesia's Import Dependency Ratio remained within acceptable limits but increased significantly beyond the 2% threshold, reaching 8.14 by 2023. Regarding Indonesia's economic goals of being a developed country, Mr. Prabowo initiated the Astacita program, the presidential mission aiming to strengthen national security and promote self-reliance in food, energy, water, creative, green, and blue economies. The potential of successful national or world food estate is the stability of rupiah depreciation against USD. The Indonesian government's initial food estate was started a long time ago. The last program is the Food Estate Program, which expands agricultural land and enhances productivity. However, past projects—such as the Central Kalimantan Food Estate—struggled with suitability issues. Under President Prabowo's astacita Initiative, the administration has targeted developing 1 million hectares of new rice fields annually from 2025 to 2029, to reduce import dependence and strengthen national food security. This study finds that spatial analysis and economic modelling could assess agricultural land suitability for rice cultivation and its potential impact on the trade balance. Through a structured literature review, this research integrates insights from historical trade performance, economic elasticity models, and geospatial methodologies to identify recommendations for food estate locations. The findings link exchange rates and export performance, showing a relation between depreciating Rupiah, which can improve rice export competitiveness while raising concerns about trade imbalances and rising costs for agricultural inputs. If the national food estate program is successful, how much will the specific region produce a commodity for export, and how it will affect the Rupiah appreciation should be further explored. Future research should further explore trade elasticity dynamics, regional agricultural comparisons, and the broader economic implications of food estate expansion to refine national agricultural and financial policies.

**Keywords :** Food Estate, Trade-Balance, Spatial Analysis, Agricultural Potential Land, Rupiah Appreciation

### **INTRODUCTION**

Indonesia is an agrarian country that produces a wide variety of food crops. Specifically, rice is cultivated across nearly all regions in Indonesia. East Java, Central Java, West Java, and South Sulawesi are the main contributors, accounting for 17.79% (equivalent to 9.68 million tons of dry grain), 17.20% (9.35 million tons), 16.97% (9.23 million tons), and 9.4% (5.11 million tons), respectively, according to the BPS Area Survey Framework from 2021 to 2023. Other provinces contribute less than 5% to the national rice production. According to the 2024 Indonesian Rice Trade Performance Analysis, Indonesia's Import Dependency Ratio (IDR) remained within acceptable limits until 2023. However, in 2023, rice imports increased significantly beyond the 2% threshold, reaching 8.14%.

Meanwhile, Indonesia's Self-Sufficiency Ratio (SSR) for rice production was 98% but significantly declined to 91.86% in 2023. This decline raises critical concerns as it approaches the minimum FAO threshold of 90%. However, on average, Indonesia's SSR has remained good and acceptable over the past four years. According to the Trade Specialization Index published by the Ministry of Agriculture's Data and Information Centre, unhusked rice (gabah) has maintained positive values over the past two years, at 0.6247 and 0.4604, while processed rice products recorded values of 0.8529 and 0.8614. These figures indicate strong international competitiveness, making rice a viable export commodity. The SSR value confirms that Indonesia has achieved food self-sufficiency for the past four years, suggesting that the country can export rice. In a limited cabinet meeting on December 30, 2024, it was officially decided that

Indonesia will not import rice in 2025, as stated by the Coordinating Minister for Food Affairs, Zulkifli Hasan (BPMI Setpres, 2024). Minister of Agriculture Regulation No. 04/2019 outlines Indonesia's strategic efforts to mobilize human resources toward becoming a global food estate by 2045. In line with this vision, President Prabowo has introduced the Astacita initiative. This presidential mission aims to strengthen national security and promote self-reliance in food, energy, water, creative, green, and blue economies. Over the next five years, the government has identified eight priority programs, one focusing on increasing agricultural land productivity by developing village, regional, and national food estate. The roadmap includes an annual target of establishing 1 million hectares of new rice fields from 2025 to 2029 (Ministry of Agriculture, 2024). During President Jokowi's administration, the development of the Food Estate Program was included in the National Strategic Projects (PSN), as stipulated in Presidential Regulation No. 109/2020. However, its implementation faced significant challenges. One of the main issues was that the food estate was established on peatland in Central Kalimantan, which was previously part of the Ex-Mega Rice Project (PLG). This resulted in substantial financial losses, as only 110,000 hectares were realized out of the 1.45 million initially planned (WRI, 2022).

Regarding Indonesia's economic goals, the fluctuations in rupiah depreciation are significant. Indonesia experienced moderate inflation after 2020. During the global COVID-19 pandemic, the pressure on exchange rates was relatively high. The USD strengthened due to the global economic crisis. The literature concludes that Indonesia's gross regional domestic product significantly affects exchange rates (Kurniati & Dini, 2024). This indicates that as GRDP in this sector increases, the exchange rate for farmers tends to decrease, suggesting that higher economic output does not directly translate into improved purchasing power for farmers.

Regarding the increase in Indonesian GDP, findings from a study show that exchange rates significantly impact export value, as evidenced by data from 1997 to 2020. This indicates that if the rupiah depreciates against the US dollar, the export value will increase, making Indonesian commodities more competitive in the international market (Laksono, 2023). In a study conducted by Ekalia in 2023, spatial approaches were utilized, implementing Spatial Auto Correlation and Spatial Error Model to examine the connection between rice exports and exchange rates. The result shows that GDP has a coefficient value of 5.899, meaning that every 1% increase in GDP correlates with a 5.899% increase in rice exports within ASEAN Plus Three.

This study addresses the results of Indonesia's failure in food estate implementation, with the goals for 2045 being to become a world food estate and achieve the status of a developed country. The conceptual framework analyzes the impact of food estate programs targeting one million hectares of rice fields annually over the next five years by integrating spatial analysis and econometric modeling. A structured literature review and empirical studies focus on trade elasticity, the GDP-exchange rate interaction, and regional agricultural productivity. The literature review will utilize government reports, policy documents, and academic journal databases to evaluate relevant studies comprehensively. Key references include the historical performance of Indonesia's rice trade, the macroeconomic impacts of agricultural exports, and spatial methodologies for land suitability analysis.

## RESEARCH METHODS

This study will follow a phased research approach to establish a more comprehensive set of key references for the model. The research is divided into a literature review, a qualitative study, and a quantitative analysis. The literature review will provide a theoretical foundation for the entire research. This stage will analyze governmental reports, policy documents, publications, and case studies to identify the current state of international food estate programs and the strength of the rupiah in global trade. Building on the foundation of the business issue, the literature review also aims to justify the shortcomings of the food estate program, which was the previous regulation governing international food estate programs. In the second phase, the primary data is collected to clarify the business issue among stakeholders. The challenge and opportunity will be gathered from the experts and the empirical practice in the field. In the last phase, the study emphasizes quantitative analysis by integrating two subjects: land suitability analysis using the spatial methodology, testing the volume of exports resulting from suitable land as a factor influencing exchange rates, and calculating the elasticity between the two. The results of this study will give the stakeholders an implication policy to consider regarding the suitable rice-field location and the potential impact on the exchange rates in achieving GDP increment.

## RESULTS AND DISCUSSIONS

Following Indonesia's food security program and self-sufficiency for food estate 2045, the history of an ambitious program has been raised since President Soeharto. It was a PLG mega project in Central Kalimantan, and the president Habibie stopped by. In the Susilo Bambang Yudhoyono era, the Merauke Food Integrated Food and Energy Estate (MIFEEE) implemented the idea of food estate, which the Ministry of Agriculture launched

on August 10th, 2010. Under President Jokowi's leadership, the government launched a Food Estate program. However, implementing the Food Estate Policy is complex, with environmental and cultural concerns. Food estate planning was used to implement the KLHS quickly (Kajian Lingkungan Hidup Strategis dengan Metode Cepat). It is not a firm foundation with the widespread wrong practice of land change under food estate justification (Azkiya et.al 2024).

Food estate practice in 2020-2022 was planned as a technology approach for the agriculture industry, from traditional practice into a modern agriculture system, such as using mechanized plowing, harvesting using specific tools, and machinery-based for spraying. However, the project on top of peatland was not successful as planned. Several factors need to be considered in the land suitability study for paddy, such as the location for each region. Land suitability could be evaluated based on current and potential conditions (FAO, 1976).

### Land Suitability

Land suitability involves evaluating and scoring a piece of land for specific uses. The methods may include matching and scoring techniques, assessing land characteristics against specific requirements, or assigning scores using a range of numerical scales interpreted relative to a predetermined threshold (Trisanti et al., 2015). Various approaches are employed in land suitability assessments, with the most comprehensive utilizing Geographic Information System (GIS) visualization. Factors influencing suitability are evaluated through geospatial methods and multiple parameters, such as temperature, water availability, soil drainage conditions, flood hazards, slope, and existing land use (Toyibulah, Fahrumsyah, et al., 2022). In Nekan Village, West Kalimantan, a study aimed to improve land suitability classifications. The methods applied included matching analyses for land characteristics, plant requirements, and the land suitability evaluation process. Data were collected using a 1:50,000 topographic map, ten years of historical climate data, and laboratory soil analyses. The parameters for land characteristics were categorized into several classes. Yearly temperature and rainfall serve as parameters with defined thresholds and numerical classifications. Field evaluations and topographic map assessments indicate that the location is most suitable for food cultivation, with varying recommendations for different plants (Pakpahan, 2020).

East Kalimantan Province prepared by the Ministry of Agriculture as a regional buffer for the new national capital through a cluster system of food crops, horticulture, livestock, and plantations using modern technology to achieve food self-sufficiency

(Sulaiman, 2019). From the current study of land suitability for agricultural commodities in East Kalimantan, assessed under current conditions using topography data, climate data, soil characteristics in wetlands, and soil characteristics in dry land. The topographic/relief for East Kalimantan was dominated by hilly areas with slope >25-40% and mountainous area slope > 40% (Kartawisastra, 2021). Using a land identification of 1:50.000 scale map, the classification of East Kalimantan soils is divided into two groups: soil in wetlands and soil in dryland. Soil in wetlands consists of peat, soils in lowland swamps, and soils in tidal swamps. The soils in dry land have a soil drainage range from poor to excessive, generally having a topography flat (0-1%) to mountainous slopes (>40%) (Kartawisastra, 2021). The largest area suitable for irrigated rice found in the East Kutai and Kutai Kartanegara regencies, covering an area of 975 thousand ha and 593,8 thousand ha respectively. The land suitable for rainfed paddy is 4.756 million ha or 37,75% of the province's area. Regarding Irawan (2015), found that in Indonesia, irrigated rice fields are the leading supplier of rice production regionally and nationally. Bhermana 2023, found that in Central Kalimantan, paddy development is possible in the wetlands area. Data inventory was collected using a sampling approach to determine the appropriate location where the specific plant existed in the 14 districts administratively in Central Kalimantan during the last 5 years, from 2015 to 2020. The geographic information system technology was implemented to integrate the database and spatial concept for spatial distribution visualization to show the pattern of the presence of local paddy genetic resources.

Key finding on the land suitability assessment for agriculture that the spatial analysis conducted will contribute significantly to the creation of suitability maps, allowing stakeholders to make decisions on the best potential crop cultivation. The methods allowing the variables selected that agricultural land suitability is influenced by slope, elevation, land use, soil texture, precipitation, temperature, soil moisture, road distance, and are calculated using the analytical hierarchy process for the more structured technique used for organizing and analyzing complex decisions (Choudhary, 2023). Choudhary finds that suitability visualization categorized into highly suitable (27.5%), moderately suitable (42.8%), marginally suitable (17.6%), and not suitable (12.1%). According to Setyanto, 2023, land suitability for rice production in East Kalimantan, specifically the area surrounding New Capital City Indonesia, is influenced by land elevation, slope, annual rainfall, soil type, and flood hazards. The criteria are Highly Suitable as S1 with 21-25 score, Moderate Suitable as S2 with 16-20 score, Marginally Suitable as S3 with 11-15 score, and Not

Suitable as N with 0-10 score. The indicators table is as follows:

**Table 1 Indicators for land suitability for rice production by Setyanto, 2023**

No	Indicators	Categories	Score	Amount
1	Land Elevation	S1	5	0-1500 masl
		S2	3	1500-2000 masl
		S3	1	2000-3000 masl
		N	0	>3000 masl
2	Slope	S1	5	0-15%
		S2	3	15-30%
		S3	1	30-45%
		N	1	>45%
3	Annual rainfall	S1	5	1500-2000mm
		S2	3	1000-1500mm or 2000-2500mm
		S3	1	500-1000mm or 2500-3000mm
		N	0	0-500mm or >3000mm
4	Soil Type	S2	3	Acrisols, histosols, fluvisols, nitisols, cambisols
		S3	1	arenosols
5	Flood hazards	S1	5	Low risk
		S2	3	Moderate risk
		S3	1	High risk

The study's findings indicate that in the food buffer area at the new capital city area, the suitability level with severe limiting factors will significantly impact productivity as the marginally suitable class, at 77.9%. Land elevation, slope, and rainfall characteristics were relatively suitable for rice crop cultivation. However, the soil characteristics, which were peaty and acidic, constrain factors in cultivating rice crops (Setyanto, 2023).

#### **Factors influence exchange rates (rupiah/USD)**

ASEAN is the world's third largest rice producing region, and its market share is 24.94% (USDA, 2020). The Covid pandemic is an important parameter significantly impacting the national economy. From domestic trade, especially agricultural products, has been disrupted by the implemented policy during a pandemic. The dynamics between regions and times require handling stock management and logistics, negatively impacting agricultural commodities export performance (Suryana et al., 2020). Based on Presidential Instruction No. 7/2009 on rice policy, the government encourages and facilitates the use of certified superior rice seeds, fertilizers, land rehabilitation, irrigation networks, enabling increased investment in the rice business sectors, rice purchasing policies, provision and distribution of subsidized rice. The government support carries out the importance of rice as a food self-sufficiency of Indonesia, and aligning with 2024 goals, Indonesia is a worldwide food estate.

Rice production in Indonesia is projected to decline by approximately 3.75% in 2024 compared to 2022, utilizing methods such as Double Exponential Smoothing. This indicates domestic production will not meet consumption demands, potentially leading to shortfalls (Setiyanto et al., 2024). The structural vector autoregression (SVAR) analysis used data from January 1993 to December 2022, sourced from various national and international channels, to assess the national-level impact. The shift-share analysis (SSA) was also applied to the rice sampling framework to evaluate the effects at the provincial level. The study employed quantitative analysis based on three approaches: time series econometrics through Structural Vector Autoregression, shift-share analysis for regional growth impacting each province, and the increasing production opportunity model. The findings indicate that rice production remains concentrated on Java Island, with declines also observed in Sumatra and Sulawesi. Some central rice-producing provinces, such as Lampung, DI Yogyakarta, Bali, and West Sulawesi, experienced an increase in harvested area despite being outside the primary rice-production locations (Setiyanto et al., 2024). Factors influence respective in elasticity values of 0.0265-0.4249 for the rupiah exchange rate against the US dollar and rice import tariffs, 0.0638-0.1876 for import volumes, 0.0698-0.1876 for consumer prices, 0.0065-0.3152 for producer prices, 0.0313-0.0920 for fertilizer prices and agricultural labour wages, and 0.2112-0.8189 for harvested areas. In the scenario analysis, this study compares reduced production caused by

climate change and global energy and food prices with increased production in scenarios 1, 2, and 3 for January-December 2023 and 2024. The analysis reveals that several provinces, including North Sumatra, West Sumatra, Riau, South Sumatra, Bengkulu, Lampung, West Java, Central Java, East Java, Bali, West Nusa Tenggara, Central Kalimantan, East Kalimantan, and West Sulawesi, have potential as harvested area options.

Economic development in developing countries heavily relies on export products, as demonstrated by Thailand (Tulasombat et al., 2015). The quantitative analysis employed was regression analysis, which uncovered the relationships between exchange rates and rice, exchange rates and rubber, and exchange rates and agricultural exports. The results indicate that if the exchange rate increases by one unit (Baht xx.0001 per US dollar), the rice volume decreases by US\$ 26.2775 million. Similarly, if the exchange rate rises by one unit (Baht xx.0001 per US dollar), the rubber volume falls by US\$ 48.022 million. Moreover, if the exchange rate increases by one unit (Baht xx.0001 per US dollar), the total volume of agricultural goods decreases by US\$ 97.287 million (Tulasombat et al., 2015).

(Muchtar et al., 2021) states Indonesia has a longstanding trade relationship with India as a primary trading partner. The balance between the two countries has shown a surplus. However, there has been a decrease in the trade balance of agricultural commodities, including rice, from 2013 to 2017. This signals Indonesia to enhance its export performance for a favourable trade balance. The data utilized in the study consists of time series data spanning 17 years, from 2001 to 2017, which includes export data from the World Trade Organization, GDP per capita, and exchange rates from the World

Development Indicators, export data from the International Trade Centre, and tariff import data from World International Trade Solutions. The study focuses on the commodities exported to India from Indonesia. The methods employed panel data regression analysis using STATA software to identify the factors influencing the exports of Indonesia's commodities. The testing models used in the study are the Chow Test, Hausman Test, and Lagrange Multiplier Test to determine the most suitable model for analyzing the data. The rupiah exchange rates against the US dollar fluctuated but generally appreciated, indicating growth in Indonesia. An appreciation of the trading partner's currency benefits exports, while depreciation can reduce export volume.

As an important commodity in Indonesia, the high demand for rice consumption requires a supply of rice to meet domestic food needs in the country. Another finding is that factors significantly affecting the rice export sector include Gross

Domestic Product, production, and exchange rates (Yusiana et al., 2022). The GDP has a coefficient value of 5.899, which means that every 1% increase in GDP leads to a 5.899% increase in rice exports in ASEAN Plus Three. The analysis shows that rice production significantly affects exports, with a production coefficient of -1.795. This means that a 1% increase in production will reduce rice exports by 1.795%. The estimation shows that the exchange rate significantly affects rice exports, with a negative coefficient of -0.001, indicating that a 1% increase in the exchange rate decreases rice exports by 0.01%. The methods align with spatial analysis by using spatial correlation analysis to understand the spatial correlation between each region and how these relationships affect rice exports.

## CONCLUSION AND SUGGESTION

The literature review discusses the relationship between agricultural land potential, rice exports, and the Rupiah's appreciation against the USD, aligning with Indonesia's economic goals for 2045 under Mr. Prabowo's Astacita program. The suggestion to optimize land suitability for rice cultivation through spatial analysis and financial modelling could potentially increase agricultural productivity and export performance. This study examines the potential of rice export performance in Indonesia, considering whether land openness or land designated for rice cultivation aligns with land suitability analysis in the study location. The analysis aims to propose a new food estate location due to the failures experienced by the Indonesian government. As the goals of the food estate remain a highlighted program by the government, this research helps to understand how to define suitable areas for rice fields using location-based analysis and approaches indicators. Rice exports in Indonesia have decreased over the past two years, while imports have significantly increased. This raises concerns for Indonesia regarding food self-sufficiency before pursuing global food estates. Kalimantan, the island containing Indonesia's capital city, particularly East Kalimantan, is positioned as a potentially harvested area based on scenario analyses comparing reduced production caused by climate change and fluctuations in global energy and food prices with increased production. The literature findings create the link between exchange rates and export performance, showing a relation between depreciating Rupiah, can improve rice export competitiveness while raising concerns about trade imbalances and rising costs for agricultural inputs. If the national food estate program is successful, how much will the specific region produce a commodity for export, and how it will affect the Rupiah appreciation should be further explored.

## REFERENCES

- Choudhary, P. (2023). Analytical hierarchy process in land suitability assessment. *Journal of Environmental Studies*.
- Kartawisastra, A. (2021). Soil characteristics and agricultural suitability in East Kalimantan. *Indonesian Journal of Soil Science*.
- Kurniati, R., & Dini, S. K. (2024). Peramalan Jumlah Produk Domestik Regional Bruto di Provinsi Nusa Tenggara Barat Tahun 2024 Menggunakan Metode Dekomposisi Multiplikatif. *Prosiding Seminar Nasional Sains Data*. <https://prosiding-senada.upnjatim.ac.id/index.php/senada/article/view/153>
- Laksono, T. Y. , et al. (2023). Exchange rate impact on agricultural exports in Indonesia: A historical perspective. *Economic Journal of Trade and Finance*.
- Muchtar, I., I\*, R., Irianto, H., & Purnomo, S. H. (2021). An analysis of factors influencing Indonesia's leading agricultural commodities export to India. *Journal of Sustainable Agriculture*, 36(1), 135–143. <https://doi.org/10.20961/carakatani.v36i1.39366>
- Pakpahan, T. E. (2020). Kajian Kesesuaian Lahan untuk Tanaman Pangan di Desa Nekan Kecamatan Entikong Kabupaten Sanggau Provinsi Kalimantan. *Jurnal AGROHITA*. <https://www.academia.edu/download/80501016/pdf.pdf>
- Setyanto, P. (2023). Land suitability for rice production in East Kalimantan. *Journal of Agricultural Land Use*.
- Sulaiman, M. (2019). Strategic agricultural commodity development in East Kalimantan: A policy perspective. *Journal of Agricultural Policy*.
- Suryana, A., Rusastra, I. W., Sudaryanto, T., & Pasaribu, S. M. (2020). JUSTIFIKASI DAN URGENSI MENUJU ADAPTASI DAN RESILIENSI SOSIAL EKONOMI PERTANIAN. *DAMPAK PANDEMI COVID-19: Perspektif Adaptasi Dan Resiliensi Sosial Ekonomi Pertanian*, 3.
- Toyibulah, Y., Fahrussyah, F., & Hasbiadi, H. (2022). Kajian Kesesuaian Lahan Tanaman Padi Sawah di Kecamatan Tanjung Selor Berbasis Sistem Informasi Geografis. *JIA (Jurnal Ilmiah Agribisnis): Jurnal Agribisnis Dan Ilmu Sosial Ekonomi Pertanian*.
- Tulasombat, S., Bunchapattanasakda, C., & Ratanakomut, S. (2015). The effect of exchange rates on agricultural goods for export: A case of Thailand. *Ojs.Amhinternational.Com S Tulasombat, S Ratanakomut Information Management and Business Review*, 2015•ojs.Amhinternational.Com, 7(1), 1–11. <https://ojs.amhinternational.com/index.php/imbr/article/view/1133>
- Yusiana, E., Hakim, D. B., Syaukat, Y., & Novianti, T. (2022). *Analysis Of Rice Exports In ASEAN Plus Three Countries*.
- Prasetyo, A., Hindani, H. N., Bintang, R. S. P., Nafisha, S. H., & Putra, Y.R. (2023). Analisis Perbandingan Nilai Ekspor Beras Indonesia & Thailand. *Student Research Journal*, 1(1), 141-150
- Wardani, C., Jamhari, Hardyastuti, S., & Suryantini, A. (2019). Kinerja Ketahanan Beras di Indonesia: Komparasi Jawa dan Luar Jawa Periode 2005-2017. *Jurnal Ketahanan Nasional*, 25(1), 107-130.
- Rosyidi, I. M., Irianto, H., & Purnomo, S. H. (2021). An Analysis of Factors Influencing Indonesia's Leading Agricultural Commodities Export to India. *Caraka Tani: Journal Of Sustainable Agriculture*, 36(1), 135-143
- Haya, M., & Sukandar, D. (2023). Indonesian Grain Production Forecasting Moving Average Method, and Exponential Smoothing. *Agrotropica: Journal of Agricultural Science*, 6(1), 14-21
- Azkiya, S., & et al. (2024). Environmental and Cultural Concerns in Food Estate Planning: A Case Study of Indonesia. *Journal of Sustainable Agriculture*, 18(2), 45-60.
- Choudhary, K., Boori, M.S., W., Valiev, A., & Kupriyanov, A. (2023). Agricultural Land Suitability Assessment for Sustainable Development Using Remote Sensing Techniques With Analytic Hierarchy Process. *Remote Sensing Applications: Society and Environment*. <https://doi.org/10/1016/j.rsase.2023.101051>
- Setyanto, D. P., Susanto, S., Setyawan, C., & Zaki, M. K. (n.d.). GIS-Based Analysis of Land Suitability For Rice Production in Food Buffer Area of New Capital City

Indonesia. *E3S Web of Conference*.  
<https://doi.org/10.1051/e3sconf/202346808004>

Bandyopadhyay, S., Jaiswal, R. K., Hegde, V.S., & Jayaraman, V. (2009). Assessment of Land Suitability Potentials for Agriculture Using a Remote Sensing and GIS Based Approach. *Journal of Remote Sensing*, 30(4), 879-895.<https://doi.org/10.1080/01431160802395235>