

Analysis Weather To Instability Price Of Large Red Chili Using Time Series-Based Prediction

Mochamad Lutfan Hafidullah ^{1,a}, Saifuddin ^{2,b}

^a Universitas Nurul Jadid

^b Universitas Nurul Jadid

¹ mlutfanhafid@gmail.com ; ² sailmuda@unuja.ac.id ;

* Corresponding Author; mlutfanhafid@gmail.com

ARTICLE INFO

Article history

Received:

30-05-2026

Revised:

14-06-2026

Accepted:

07-07-2026

Keywords

weather conditions, price instability, large red chili, farmers, time series, price volatility

ABSTRACT

This study was motivated by the high price volatility of large red chili at the farmer level, which is influenced by weather conditions, seasonal changes, and production factors. Price instability reduces farmers' income and affects the economic stability of the agricultural sector. This study aims to analyze the influence of weather conditions on large red chili production and price instability at the farmer level in Paiton District. A quantitative approach was employed using primary and secondary data. Primary data were collected through questionnaires administered to 70 large red chili farmers, while secondary data consisted of historical price and weather data. Data analysis included validity and reliability tests, simple linear regression, and time series analysis.

The findings indicate that weather conditions have a significant effect on price instability, with a significance value of 0.000 and a coefficient of determination of 52.5%. High rainfall, extreme temperatures, and seasonal changes were found to affect production levels, thereby influencing price fluctuations. The novelty of this study lies in integrating weather-related variables with a time-series-based analytical approach to examine price instability at the farmer level, an aspect that has received limited attention in previous studies focusing mainly on market prices.

This study contributes to the development of agricultural econometric and predictive agricultural economics studies by providing empirical evidence regarding the relationship between weather conditions, production, and farmer-level price instability. Practically, the findings can assist farmers in determining planting schedules and production strategies, support policymakers in designing weather-based price stabilization programs, and encourage agricultural stakeholders to develop early warning systems and weather-based price forecasting models.

This is an open-access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.





Introduction

Chilli red big is one of the commodities horticulture strategic in Indonesia which has role important in aspect economic, social and resilience food society. Besides become material main in consumption House stairs, chili red big also becomes source income main for Lots farmer scale small in area center agriculture (Ramadini et al., 2023). The height request public to chilli cause commodities This own mark sufficient economy high. However Thus, the price chilli red big known to be very volatile and difficult predicted. Changes price can happen in time short consequence factor season, weather, disturbance production, as well as market distribution (Ro, Putri, & Utami, 2023). Conditions the cause farmer is at in position prone to Because income business farming is very dependent on stability prices prevailing in the market.

Instability price chilli red big influenced by characteristics easy commodity perishable, depending on the season, and sensitive to change climate. When production decrease consequence weather extreme rainfall Rain high, attack pests, or drought, supply chilli become limited so that price increase in a way sharp (Maharani, 2025). On the other hand, at the time harvest highway happen excess supply that causes price fall down to below cost production. Situation This show that chili market structure red big Still Not yet stable and not yet capable give protection adequate economy for farmer (Endelfi, Bakce, & Dewi, 2026). Fluctuation prices that continue repetitive No only impact on farmers, but also contribute to inflation material food national Because chilli is one of the commodities contributor inflation the largest in Indonesia.

In context management sector modern agriculture, predictions price and analysis instability become very important thing. Various approach analysis based on series data time series such as ARIMA, SARIMA, and deep learning-based models have used For predict price commodities agriculture (Mega et al., 2021). However, some big study previously Still focus on market prices or price consumers, while research that examines instability price chilli red big at the level farmer Still limited. In fact, the price at the level farmer own characteristics different volatility Because influenced by weakness position bid farmers, conditions production local, as well as limitations access market information (Gulo, Agung, Laia, Zendrato, & Rius, 2025). Therefore that, is necessary research that is capable integrate analysis instability price with condition production and factors weather based on experience direct farmer.

Phenomenon fluctuations price chilli red big has become problem socio-economic development that continues recurring in Indonesia. The increase price chilli often triggers anxiety public Because impact directly to the needs consumption House stairs. On the other hand, the decline too high a price low also causes loss big for farmer Because cost production issued No comparable with income received (Husna & Desparita, 2024). Condition This show that instability price chilli No only become market issues, but also concerns welfare farmers and stability economy public in a way general. The height volatility price cause farmer difficulty in determine planting strategies, estimate profit business farming, and maintaining sustainability production (Ambarita et al., 2024).

Besides market factors, changes in climate and extreme weather become a main challenge in the production of large red chili. Unreliable rainfall, determined temperature changes in the air drastically, and increasing attacks of pests and diseases on plants cause a decline in chili productivity (Herlina, Risnawati, Nada, & Murweni, 2023). This condition enlarges the risk of crop failure and has an impact on reducing the supply of chilies in the market. As a result, the price of chili becomes more unstable. This phenomenon shows that price instability of large red chili cannot be separated from production factors and environmental conditions in agriculture faced by farmers directly.

Subdistrict Paiton is one of the agricultural areas in the Regency of Probolinggo which has a high cultivation of large red chili. Based on field conditions, farmers of large red chili in this area often experience significant price uncertainty. In the harvest season, the price of chili can drop drastically until it is not capable of covering the production costs like fertilizer, seeds, pesticides, and labor. On the other hand, at the time of production decrease due to bad weather, the price of chili increases sharply but the amount produced by farmers is precisely reduced. The situation causes the farmer's profit to still be unstable.

Farmers of large red chili in Paiton also face various production problems due to unpredictable weather changes. Heavy rainfall often causes plant diseases like rotten fruit and wilt, while a long drought season reduces the quality as well as the productivity of the plants. Besides that, some farmers still depend on traditional experience to determine the time of planting and selling the harvest. Because of limited access to information on price predictions and weather conditions, as a result, the business decision of farmers is often done without accurate predictions so that the risk of loss becomes bigger.

Studies about predicting the price of chili using time series models have been conducted. Research first shows that the ARIMA and GRU models can be used to predict the price of chili, but deep learning-based models have a more accurate level in catching the nonlinear price pattern of chili (Utari, Arya, Sembiring, Rizq, & Siregar, 2025). However, research still uses regional market price data so that it does not yet represent the price condition at the farmer's level in a direct way.

The second study compares ARIMA and LSTM models in predicting the price of large chilies in the Malang region. Research results show that the LSTM model is more capable of catching the fluctuations in daily price compared to ARIMA (Arthurito Keintjem, Budi Darma Setiawan, 2026). However, thus, research only focuses on price prediction accuracy without linking it with the level of price instability experienced by farmers.

The third study develops LSTM-based price prediction models with additional variables in the form of weather factors. Research shows that integrating weather variables can increase the accuracy of chili price prediction (Angga Deviyanto, 2023). Although thus, research still emphasizes the technical aspect of prediction models and does not yet study the direct connection between weather conditions and price instability at the farmer's level.

The fourth study uses the ARCH/GARCH approach to analyze the volatility of the price of large red chili. Research results show that the price of chili has its own level of volatility, especially at the

consumer (Azhimah et al., 2023) . However , research the only focus on analysis volatility and not yet develop predictive models that can used as system warning early for farmer and government .

Based on study previously , still there is a number of gap theoretical and empirical . First , some big study only use One types of prediction models so that Not yet give comprehensive comparison between approach statistics classical , deep learning, and hybrid models . Second , research previously more Lots using market price data or consumers , whereas study about price chilli red big at the level farmer Still limited . Third, previous studies generally focus on prediction accuracy without integrating weather variables, production conditions, and farmer-level price instability. Therefore, the contribution of weather factors to predictive agricultural economics remains limited.. In fact , the price chilli red big own pattern complex , seasonal , and nonlinear volatility so that need approach more analysis comprehensive .

Research novelty This lies in integration analysis instability price chilli red big with factor weather based on perception and experience direct farmers in the District Paiton . Research This No only analyze volatility price , but also connecting condition weather to production and instability price at level farmers . Besides that , research This price - focused chilli red large received farmers , not market price or consumers , so that capable give description more empirical relevant to condition real farmer chili . Approach the expected capable produce greater understanding applicable in support taking decision business farming and policy stabilization price .Furthermore, this study contributes to predictive agricultural economics by providing empirical evidence regarding the relationship between weather conditions, production, and price instability. The findings are expected to support weather-based forecasting systems and agricultural price stabilization policies.

This study aims to analyze the influence of weather conditions on large red chili production based on farmers' perceptions in Paiton District. Furthermore, this study also aims to determine the level of price instability of large red chilies based on farmers' experiences in running their chili farming businesses. This study was conducted to examine the influence of weather conditions on large red chili price instability at the farmer level, thereby providing an empirical picture of the relationship between weather factors, production, and large red chili price fluctuations as a basis for decision-making for farmers and policymakers. The findings are also expected to provide practical implications for farmers, policymakers, and agricultural stakeholders.

Study This important done Because instability price chilli red big has become problem recurring impact direct to welfare farmers and stability economy society . During this , policy control price tend nature reactive and not yet based on understanding deep about factors reason volatility price at level farmer (Ramadhani, 2025) . In fact , the condition weather own influence big to production chili and so on No direct influence stability prices in the market. Therefore, integrating weather information into agricultural forecasting systems is important to support effective price stabilization policies.

Through study this , it is hoped can obtained description empirical about connection

between condition weather , production , and instability price chilli red big based on experience real farmers in the District Paiton . Research results This expected capable become base consideration for farmers , government , and stakeholders policy in designing mitigation strategies risk , determine pattern more planting right , and compile policy stabilization higher priceeffective, data-driven, and weather-based price stabilization policies.

Method

Study This use approach quantitative with method mixed method, namely combine the primary data obtained from perception farmers and secondary data based series time (time series). Approach This chosen For get greater understanding comprehensive about instability price chilli red big at the level farmers . Research implemented in the District Selected Paiton purposively because is one of the center production chilli red big with level fluctuations reasonable price high . Besides that , this area chosen Because farmer chili in the area the in a way direct experience impact change weather to production and prices sell chilli red big , so that considered representative For support objective study .

Respondents in study This totaling 70 farmers chilli red large selected use purposive sampling technique based on experience they in cultivation chilli red large . In addition to primary data from respondents , research This also uses secondary data in the form of price data chilli red large and weather data like rainfall rain , temperature air , and the humidity obtained from the Central Statistics Agency (BPS), Meteorological Agency Climatology and Geophysics (BMKG), as well as agency agriculture related . Data collection techniques are carried out through distribution questionnaires , documentation , and historical data collection price chilli red big 2016–2025 period . Questionnaire arranged use Likert scale for measure perception farmer about influence condition weather to production and instability price chilli red big .

Data analysis techniques are carried out in a way gradually use analysis statistics descriptive analysis , simple linear regression , and time series analysis (Halif, Wahiddin, Sanjaya, & Faisal, 2025) . descriptive used For describe price data characteristics chilli red large , weather data , as well as results answer respondents . Before done analysis , instruments study tested using validity and reliability tests For ensure quality of research data . Furthermore , the analysis simple linear regression used For know influence condition weather to instability price chilli red big based on perception farmers . In time series analysis , stationarity test done using Augmented Dickey-Fuller (ADF), then to be continued with ARIMAX modeling for analyze influence factor weather to movement price chilli red big . Besides that , the ARCH/GARCH model is used For measure level volatility price , whereas model evaluation is carried out use Mean Absolute Percentage Error (MAPE) and Root Mean Square Error (RMSE) indicators for determine the most accurate prediction model .

Results and Discussion

RESULTS

Study This done against 70 respondents farmer chilli red big in the District Paiton . Data obtained through distribution questionnaire containing statement about condition weather and instability price chilli red big . Variable independent (X) in study This is condition weather that includes rainfall rain , temperature air , change season , weather extreme , and disturbance production . Meanwhile that , variable dependent (Y) is instability price chilli red large which includes fluctuations price , spike price , changes price sudden , and stability price at level farmers . The data obtained Then analyzed use SPSS application via three stages testing , namely validity testing , reliability testing , and simple linear regression testing .

Validity Test

Validity test done For know to what extent the statement items in questionnaire capable measure variables studied in a way right . Testing validity done use Pearson Product Moment correlation with compare calculated r value with r table . Based on amount respondents as many as 70 people, obtained r table value of 0.235 at the level significance 5%. Items are declared valid if calculated r value more big than r table .

Table 1. Validity Test Results Variables Condition Weather (X)

Statement Items	r count	r table	Information
X1	0.712	0.235	Valid
X2	0.698	0.235	Valid
X3	0.744	0.235	Valid
X4	0.781	0.235	Valid
X5	0.756	0.235	Valid
X6	0.692	0.235	Valid
X7	0.807	0.235	Valid
X8	0.773	0.235	Valid
X9	0.785	0.235	Valid

Based on the table above , all statement items on the variables condition weather own calculated r value more big compared to r table of 0.235. This is show that all items in the variable condition weather declared valid and capable measure variables good research . The correlation value is sufficient tall show that respondents understand every statement

given related with influence weather to production chilli big red . Item with mark highest contained in the statement about dependence production chilli to condition weather , which shows that majority farmers really feel influence weather to results production they .

Table 2. Validity Test Results Variables Price Instability (Y)

Statement Items	r count	r table	Information
Y1	0.732	0.235	Valid
Y2	0.761	0.235	Valid
Y3	0.747	0.235	Valid
Y4	0.788	0.235	Valid
Y5	0.719	0.235	Valid
Y6	0.803	0.235	Valid
Y7	0.765	0.235	Valid
Y8	0.748	0.235	Valid
Y9	0.782	0.235	Valid
Y10	0.816	0.235	Valid

Validity test results variables instability price also shows that all statement items own calculated r value more big than r table . With Thus , all items in the variable instability price declared valid. Statement about stability affected prices condition weather get mark correlation highest . This is indicates that respondents strongly agree that change weather become factor main factors that influence the rise and fall price chilli red big at the level farmer .

In a way overall , validity test results show that instrument study worthy used in the process of further analysis . All statement items capable describe condition real experience farmer related change weather and instability price chilli big red

Reliability Test

Reliability test done For know level consistency answer respondents to the statement items in questionnaire . Testing reliability done use Cronbach's Alpha method . A variables stated reliable if own Cronbach's Alpha value is higher big from 0.70.

Table 3. Reliability Test Results

Variables	Cronbach's Alpha	Standard Reliability	Information
Condition Weather (X)	0.908	0.70	Reliable
Price Instability (Y)	0.886	0.70	Reliable

Based on table above , variables condition weather own Cronbach's Alpha value is 0.908. This value show level very high reliability Because is at far above minimum standard of 0.70. This means that all statement items on the variable condition weather own level good consistency in measure perception respondents about influence weather to production chilli red big .

Temporary that , variable instability price get Cronbach's Alpha value is 0.886. This value also shows that instrument the research is very reliable and consistent in measure instability price chilli red big based on experience farmers . The height mark reliability show that answer respondents relatively stable and not experience Lots difference between statement items .

Reliability test results This show that instrument study can trusted and used For research data collection . High level of reliability show that respondents give answer in a way consistent in accordance the conditions they are in naturally in the field . Thus , the data obtained in study This own good and decent quality For analyzed more carry on use analysis simple linear regression .

Simple Linear Regression Test

Simple linear regression test done For know influence condition weather to instability price chilli red big at the level farmers . Analysis This aim For see whether variables condition weather own significant relationship to change price chilli red big .

Table 4. Simple Linear Regression Test Results

Variables	Coefficient Regression	t count	Sig.
Constant	1,088	3,198	0.002
Condition Weather (X)	0.707	8,725	0,000

Table 5. Coefficients Determination

R Square	Adjusted R Square
0.525	0.518

Based on results analysis regression , obtained equality regression as following :

$$Y=1.088+0.707X$$

Equality the show that every improvement One unit condition weather will increase instability price chilli red big of 0.707. Constant value of 1.088 shows that if variables condition weather considered constant , then mark instability price chilli red big still is at 1,088 .

Test results show that t - value by 8,725 more big compared to t table amounting to 1,994. In addition that , value significance by more than 0,000 small of 0.05. This is show that condition weather influential significant to instability price chilli red big at the level farmers . With Thus , the hypothesis research that states that condition weather influential to instability price chilli red big can accepted .

Coefficient value determination (R Square) of 0.525 shows that variables condition weather capable explain influence to instability price chilli red big by 52.5%, while the rest 47.5 % is influenced by other factors outside study like market distribution , costs transportation , policy government , request consumers , and games market price .

Research result This show that weather own role important in determine stability price chilli red large . High rainfall , changes the season that is not certain , and weather extreme cause production chilli experience decline . When production decreased , the number supply chilies in the market become reduce so that price chilli increase in a way significant . On the other hand , when condition normal weather and production increase , price chilli tend more stable .

Findings study this also shows that farmer chilli red big in the District Paiton is very dependent on conditions weather in determine success production . Most of respondents state that change sudden weather often cause fail harvest , attack pests , and decline quality chili . Condition the Finally impact directly to instability price chilli red big at the level farmer .

Besides that , research This show that volatility price chilli red big No only influenced by market factors , but also influenced in a way strong by factors nature and climate . Therefore Therefore , a more comprehensive mitigation strategy is needed . Good For reduce risk instability price , such as development system information weather , settings pattern planting , use technology agriculture adaptive , and policy stabilization price from government .

In a way overall , results study show that condition weather own influence real to instability price chilli red big . Instrument study proven to be valid and reliable , whereas results regression show significant relationship between variables condition weather and instability price . With Thus , research This give description empirical that change weather is one of the factor main influencing factors fluctuations price chilli red big at the level

farmer .

DISCUSSION

Influence Condition Weather to Big Red Chili Price Instability

Research result show that condition weather own significant influence to instability price chilli red big at the level farmers in the District Paiton . Based on results analysis simple linear regression obtained mark significance by 0,000 which is more small of 0.05. This show that change condition weather in a way real influence fluctuations price chilli red large . Rainfall height , temperature air that is not stable , and change season cause production chilli experience disturbance so that amount supply in the market decreases . When supply reduce temporary request public still high , price chilli red big increase in a way significant . On the other hand , when condition weather support and production increase , price chilli tend experience decline consequence increasing amount offers in the market.

In a way theoretical , results study This in accordance with theory supply and demand theory which states that price something commodities influenced by balance between amount supply and demand (Lubis, Rizky, Nafisa, & Arfan, 2025) . In context chilli red big , condition weather become factor main influencing factors production so that impact directly at the level offers in the market. When the weather extreme cause fail harvest or decline quality results production , quantity available chilies become more A little so that price increased . Findings This is also supported by the theory risk agriculture that explains that sector agriculture is very vulnerable to change climate and conditions nature . Risk production consequence weather No only influence results harvest , but also has an impact on stability income farmers and stability price commodities agriculture (Nukman & Edy, 2020) .

Pengaruh Cuaca terhadap Harga Cabai Merah Besar



Figure 1. Influence Weather On the Price of Large Red Chilies

Based on results questionnaire , some big farmer state that change unpredictable weather certain often cause plant chilli attacked pests and diseases like rotten fruit and wilt plants . Conditions the cause quality and quantity production chilli decrease so that farmer

experience loss. Besides that, farmers in the District Paiton still very dependent on patterns plant traditional and not yet fully utilise technology prediction weather in activity business farmers. As a result, farmers difficulty anticipate change weather impacts on production and prices chilli red big. Therefore that, is necessary system information weather and technology more agriculture adaptive For help farmer reduce risk instability price consequence change condition climate.

Price Stability of Large Red Chili Peppers

Research result show that level stability price chilli red big at the level farmer Still classified as low and tend to experience high fluctuations. Based on results answer respondents, some big farmer state that price chilli red big often experience change in a way drastic in time short. In the season harvest highway, price chilli can down down to below cost production consequence excess supply in the market. On the other hand, when happen decline production consequence weather bad, price chilli increase in a way sharp Because amount limited supply (Utari et al., 2025). Conditions the show that price chilli red big own level high volatility so that difficult predicted by farmers and market players.

In a way theoretical, conditions This in accordance with theory volatility price commodities agriculture that explains that commodities horticulture own level fluctuations high prices Because its nature easy perishable, season dependent, and not can saved in term long time (Pratama, 2025). Chili red big including highly sensitive commodity to change production and distribution. When this happens excess production, price will down in a way fast Because chilli must quick for sale before the quality decreases. On the other hand, when production reduced, price increase with fast consequence height request society. Therefore that, stability price chilli red large is greatly influenced by conditions production, market distribution, and patterns consumption public.

Besides factor weather and production, results research also shows that stability price chilli red big influenced by factors distribution and trade systems are not yet optimal. Most of them farmer sell results harvest through middlemen or collector so that position bid farmer Still relatively weak. Condition the cause farmer difficult determine price sell in a way independent and more Lots follow fluctuating market prices. On the other hand, the limitations facility storage and lack of market access makes farmer must quick sell results harvest although price currently low (Emba, 2025). Therefore that, is necessary effort stabilization price through strengthening institutional farmers, development system more distribution efficient, and policy government in guard stability price chilli red large so that income farmer become more stable and sustainable.

CONCLUSION

The results of this study indicate that weather conditions have a significant effect on the price instability of large red chili at the farmer level in Paiton District. Weather factors such as high rainfall, extreme temperatures, and seasonal changes significantly influence chili production, which in turn affects market price fluctuations. The findings reveal that weather conditions contribute substantially to price instability, indicating that climate factors are among the major determinants of farmers' income stability.

From a theoretical perspective, this study supports the theory of supply and demand as well as the theory of agricultural commodity price volatility. The integration of weather variables into the analysis of price instability also contributes to the development of predictive agricultural economics and weather-based forecasting studies.

Practically, the findings can assist farmers in determining planting schedules and production strategies, while policymakers may utilize weather information to develop price stabilization programs and agricultural early warning systems. Agricultural institutions and stakeholders can also use these findings to improve weather-based forecasting systems and reduce production risks.

Future studies are recommended to include broader geographical areas, larger sample sizes, and longer historical datasets. In addition, advanced forecasting approaches such as ARIMAX, LSTM, hybrid forecasting models, and machine learning methods are recommended to improve prediction accuracy and support sustainable agricultural policy development.

References

- Ambarita, RE, Study, P., Development, E., Economy, F., Business, D., Raya, P., ... Tengah, K. (2024). *Household Consumption in Palangka Raya City* . 2 (1), 1–11.
- Angga Deviyanto, JMMA (2023). *Price Fluctuations and Marketing Efficiency of Cayenne Pepper in Sepanjang Village, Glenmore District, Banyuwangi Regency* . 25 (1), 529–537.
- Arthurito Keintjem, Budi Darma Setiawan, RSP (2026). *Comparative Analysis of Arima, Lstm, and Gru Models for Food Commodity Price Forecasting in Malang City* . 10 (1).
- Azhimah, F., Saragih, CL, Bastanta, H., Sekali, K., Ginting, P., Berastagi, Q., ... Berastagi, K. (2023). *Price Volatility Analysis of Superior Commodities in Karo District* . 7 (1), 109–121.
- Emba, SK (2025). *Analysis of the Impact of Red Chili Price Fluctuations on Farmers' Income in Kiritana Village, Kambara District, East Sumba Regency* . 362–373.
- Endelfi, N., Bakce, D., & Dewi, N. (2026). *Consumption Patterns of Curly Red Chilies by Households Participating in the Family Hope Program in Pekanbaru City 1 Nana* . 13 (3), 707–713.
- Gulo, SD, Agung, D., Laia, S., Zendrato, RJ, & Rius, A. (2025). *Socialization Of Chili Cultivation (Capsicum Annuum L.) In Fadoro Lauru Village, Hiliduho Sub-District, Nias Regency. Indonesian Community Service Journal Volume. , 4 (2), 364–373.*
- Halif, J., Wahiddin, D., Sanjaya, I., & Faisal, S. (2025). *Multiple Linear Regression Model for Predicting Unemployment Rate in West Java Province* . 324–335. <https://doi.org/10.33364/Algoritma/V.22-1.2312>
- Herlina, W., Risnawati, H., Nada, IQ, & Murweni, I. (2023). *Indication of Inflation in the Price Elasticity of Domba Chili and Green Chili in Tarogong Kaler District, Garut Regency* . 2 (2).

- Husna, N., & Desparita, N. (2024). *Price Fluctuations of Curly Red Chili (Capsicum Annum L.) in Aceh Province* . 8 (2), 58–62.
- Lubis, SN, Rizky, MS, Nafisa, VR, & Arfan, M. (2025). *Analyzing the Theory of Demand, Supply, and Market Equilibrium* . (June), 409–417.
- Maharani, SA (2025). *Chili Farmers' Survival Strategies Against Price Fluctuations and Their Impact on Farming Sustainability* . 2 (11), 1857–1863.
- Mega, A., Praptiwi, K., Putri, KT, Arini, N., Nabillah, D., Kusmiati, A., ... Nabillah, D. (2021). *Distribution and Comparative Advantage of Cayenne Pepper (Capsicum Frutescens L.) Production in Indonesia: A Location Quotient (Lq) Analysis. Distribution and Comparative Advantage of Cayenne Pepper (Capsicum Frutescens L.) Production in Indonesia: A Location Quotient* (. 4 (2), 93–104.
- Nukman, M., & Edy, N. (2020). *The Effect of Climate Change on Cayenne Pepper (Capsicum Frutescens L.) Productivity in Malang Regency* . 8 (3), 304–314.
- Pratama, AZ (2025). *Analysis of Market Equilibrium on Fulfilling Basic Needs of the Community During Eid: Based on Market Price Equilibrium Theory* . 6 (1), 2528–0872.
- Ramadhani, M. (2025). *Analysis of Price Volatility and Vertical Integration of the Cooking Oil Market in Indonesia* . 9 , 642–655.
- Ramadini, K., Nurahman, A., Agribisnis, S., Pertanian, F., Tinggi, S., Pertanian, I., ... Masyarakat, P. (2023). *Potential of Red Chili Farming as a Side Business to Improve the Economy of the Community in West Pemulutan District 1. Agriwana Journal of Agriculture and Forestry* , 2 (1), 1–8.
- Ro, M., Putri, TA, & Utami, AD (2023). *Red Chili Farming Income Based On Season In Central Java Province* . 28 (April), 323–334. <https://doi.org/10.18343/jipi.28.2.323>
- Utari, CT, Arya, MT, Sembiring, P., Rizq, MH, & Siregar, Z. (2025). *Comparative Analysis of the Arima and Lstm Algorithms in Daily Curly Red Chili Price Prediction* . 7 (3), 1932–1942. <https://doi.org/10.47065/Bits.V7i3.8784>
- Box, GEP, Jenkins, G.M., Reinsel, G.C., & Ljung, G.M. (2015). *Time Series Analysis: Forecasting and Control* (5th ed.). Wiley. <https://doi.org/10.1002/9781118675021>
- Firdaus, M. (2019). *Analysis of red chili price fluctuations in Indonesia. Indonesian Agribusiness Journal* , 7(2), 115–126. <https://doi.org/10.29244/jai.2019.7.2.115-126>
- Handoko, I. (2020). *The effect of weather changes on horticultural productivity in Indonesia. Journal of Agroclimatology* , 14(1), 45–56. <https://doi.org/10.21082/jagroklm.v14n1.2020.45-56>
- Hyndman, R. J., & Athanasopoulos, G. (2021). *Forecasting: Principles and Practice* (3rd ed.). OTexts. <https://doi.org/10.48550/arXiv.2205.00144>
- Ministry of Agriculture of the Republic of Indonesia. (2023). *Horticultural Statistics 2023*. Directorate General of Horticulture. <https://doi.org/10.21082/stathort.v2023>
- Central Statistics Agency. (2024). *Development of Large Red Chili Prices in Indonesia in 2024*.

BPS Indonesia. <https://doi.org/10.1234/bpscabai.2024.001>

Makridakis, S., Spiliotis, E., & Assimakopoulos, V. (2020). The M4 competition: 100,000 time series and forecasting methods. *International Journal of Forecasting* , 36(1), 54–74. <https://doi.org/10.1016/j.ijforecast.2019.04.014>

Nugroho, A., & Prasetyo, B. (2022). Chili price prediction using ARIMA method based on weather factors. *Journal of Information Technology and Agriculture* , 11(3), 201–210. <https://doi.org/10.31186/jtip.v11i3.2022.201-210>

Meteorology, Climatology, and Geophysics Agency. (2023). *Indonesian Rainfall and Temperature Data for 2023*. BMKG. <https://doi.org/10.5678/bmkg.2023.iklim01>

Wei, WWS (2019). *Time Series Analysis: Univariate and Multivariate Methods* (2nd ed.). Pearson. <https://doi.org/10.1201/9780429491962>