

## INTISARI

### **PREDIKSI CURAH HUJAN DENGAN *RADIAL BASIS FUNCTION NEURAL NETWORK* DAN KORELASINYA DENGAN PRODUKSI TANAMAN CABAI RAWIT (*Capsicum frutescens*) DI KECAMATAN SAWANGAN KABUPATEN MAGELANG**

Oleh :

**AZKA SINATRYA**  
**23/524113/PTP/02014**

Perubahan iklim menyebabkan anomali curah hujan yang berdampak langsung pada penurunan produktivitas tanaman hortikultura, khususnya cabai rawit (*Capsicum frutescens*). Penelitian ini bertujuan menganalisis pengaruh indeks iklim global terhadap curah hujan di Kecamatan Sawangan melalui pengembangan model prediksi. Selain itu, dianalisis pula hubungan intensitas curah hujan terhadap produksi melalui implementasi model. Pemodelan dilakukan menggunakan metode *Radial Basis Function Neural Network* (RBFNN) dengan integrasi *Principal Component Analysis* (PCA) untuk menyederhanakan variabel input indeks iklim. Akurasi model dievaluasi menggunakan parameter *Root Mean Squared Error* (RMSE), *Nash-Sutcliffe Efficiency* (NSE), dan validasi  $R^2$ . Selanjutnya, hasil prediksi dikorelasikan dengan data produksi cabai untuk menguji relevansi model terhadap kondisi aktual. Hasil penelitian menunjukkan bahwa konfigurasi model memberikan performa yang bervariasi. Model dengan akurasi terbaik berdasarkan evaluasi yaitu model pada rentang 15 tahun menggunakan PCA 3 indeks iklim global dan pada persentase training 90% (RMSE: 101,39; NSE: 0,72678). Namun, untuk validasi dan korelasi terhadap produksi, ditemukan bahwa rentang 15 tahun menggunakan PCA 5 indeks iklim global dan pada persentase training 70% adalah model terbaik dengan nilai  $R^2$  tertinggi yaitu 0,8572 dan nilai korelasi yang mendekati aktual. Variasi periode data, jumlah indeks iklim, dan proporsi data training memengaruhi performa model. Penambahan volume data dan kompleksitas variabel tidak selalu meningkatkan akurasi, sehingga diperlukan identifikasi titik optimum untuk menghasilkan model prediksi yang paling andal.

**Kata Kunci** : Curah Hujan, Indeks Iklim Global, *Principal Component Analysis* (PCA), *Radial Basis Function Neural Network* (RBFNN), *Capsicum frutescens*.

## ABSTRACT

***RAINFALL PREDICTION WITH RADIAL BASIS FUNCTION NEURAL NETWORK AND ITS CORELLATION WITH BIRD'S EYE CHILI CROP (*Capsicum frutescens*) PRODUCTION IN SAWANGAN SUB-DISTRICT MAGELANG DISTRICT***

By :

**AZKA SINATRYA**  
**23/524113/PTP/02014**

*Climate change causes rainfall anomalies that directly impact the decline in horticultural crop productivity, particularly bird's eye chili (*Capsicum frutescens*). This study aims to analyse the effect of global climate indices on rainfall in Sawangan Subdistrict through the development of a prediction model. In addition, the relationship between rainfall intensity and production is analysed through the implementation of the model. Modeling was performed using Radial Basis Function Neural Network (RBFNN) method with Principal Component Analysis (PCA) integration to simplify the climate index input variables. Model accuracy was evaluated using the Root Mean Squared Error (RMSE), Nash-Sutcliffe Efficiency (NSE), and  $R^2$  validation parameters. Furthermore, the prediction results were correlated with chili production data to test the relevance of the model to actual conditions. The results of the study show that model configurations provide varying performance. The model with the best accuracy based on evaluation is the model in the 15-year range using PCA 3 global climate indices and training percentage of 90% (RMSE: 101.39; NSE: 0.72678). However, for validation and correlation with production, it was found that the 15-year range using PCA 5 global climate indices and training percentage of 70% was the best model with highest  $R^2$  value of 0.8572 and correlation value close to actual value. Variations in data period, number of climate indices, and training data proportion affect model performance. Adding data volume and variable complexity does not always improve accuracy, so it is necessary to identify the optimum point to get the most reliable prediction model.*

*Keywords: Rainfall, Global Climate Index, Principal Component Analysis (PCA), Radial Basis Function Neural Network (RBFNN), *Capsicum frutescens*.*