**LITERATURE SURVEY**

**1.** [**https://oar.icrisat.org/3671/**](https://oar.icrisat.org/3671/)

**Modeling Growth and Yield of Groundnut (Boote et al., 1992)**

**Summary:**

Crop growth simulation and yield prediction for groundnut is the theme of this paper, particularly it discusses the PNUTGRO model and associated research on yield influencing factors by environmental factors such as row spacing, evapotranspiration, and temperature stress. The improvements in this model, along with a new submodel for photosynthesis, especially transformed it into a good tool for agricultural decision-making.

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| **Aspect** | Details |
| Title | Modelling Groundnut Growth and Yield. |
| |  | | --- | | **Research Focus** |  |  | | --- | |  | | Development and improvement of PNUTGRO model for groundnut yield forecast. |
| **Strengths** | Environmental and management factors. |
| Key Findings | Works well to predict yields; improved for stress and evapotranspiration. |
| Models Used | PNUTGRO-version 1.02 with photosynthesis submodel hedgerow. |
| Open Areas/Gaps/Issues | Needs validation in more places, especially where the weather conditions are really extreme. |
| Results | Major overhauls in the model, very dynamically responsive to every input on a daily basis. |
| Potential Research Directions | Additional datasets, improvement in stress response accuracy. |
| Data Set Used | Data from experimental results of India; farm level test for four years under process. |
| Accuracy Metric | 71% (Pod Yield Variation). |

**2.** [**https://www.researchgate.net/profile/Vinita-Shah/publication/326112319\_Groundnut\_Crop\_Yield\_Prediction\_Using\_Machine\_Learning\_Techniques/links/5c4e9d9b458515a4c74584c7/Groundnut-Crop-Yield-Prediction-Using-Machine-Learning-Techniques.pdf**](https://www.researchgate.net/profile/Vinita-Shah/publication/326112319_Groundnut_Crop_Yield_Prediction_Using_Machine_Learning_Techniques/links/5c4e9d9b458515a4c74584c7/Groundnut-Crop-Yield-Prediction-Using-Machine-Learning-Techniques.pdf)

**Groundnut Crop Yield Prediction Using Machine Learning Techniques (Shah & Shah, 2018)**

**Summary**: This study applies machine learning techniques to predict groundnut yield using environmental and soil data from Gujarat. The authors evaluate various models, including regression, K-nearest neighbors, and artificial neural networks, concluding that KNN provides the most accurate results. The paper underscores the value of machine learning in agricultural yield forecasting.

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| **Aspect** | Details |
| Title | Groundnut Crop Yield Prediction Using Machine Learning Techniques. |
| |  | | --- | | **Research Focus** |  |  | | --- | |  | | Machine learning models for predicting groundnut yield. |
| **Strengths** | Multiple machine learning algorithms are compared in a comprehensive manner. |
| Key Findings | For environmental data, KNN performs best for predicting the yields of groundnuts. |
| Models Used | Multiple Linear Regression (MLR) Regression Tree ANN KNN |
| Open Areas/Gaps/Issues | Limited to a particular region; deep learning models not explored. |
| Results | KNN has predicted with highest accuracy. |
| Potential Research Directions | Deep learning; different crops/regions were tested on models |
| Data Set Used | data of groundnut from four districts of Gujarat from 2006 to 2013. |
| Accuracy Metric | RMSE (Artificial Neural Network)-978.3817 |

**3.** [**https://journal.agrimetassociation.org/index.php/jam/article/view/2194**](https://journal.agrimetassociation.org/index.php/jam/article/view/2194)

**Development of Groundnut Yield Forecasting Models in Relation to Weather Parameters (Andhra Pradesh, India)**

**Summary:** In this paper, it is studied how weather variables can be applied to groundnut yield forecasting in Andhra Pradesh. The study showed that the climatic-related factors like rainfall and temperature tend to be instrumental in yield prediction. These models developed from the study help guide agricultural decisions according to local climatic conditions.

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| **Aspect** | Details |
| Title | Developing Groundnut Yield Forecasting Models Considering the Weather Parameters in the Andhra Pradesh State of India. |
| |  | | --- | | **Research Focus** |  |  | | --- | |  | | Weather-based Groundnut yield forecasting models. |
| **Strengths** | It highlights that weather at the local scale, in particular, is unavoidable in the process of yield forecasting. |
| Key Findings | Groundnut yield largely depends on weather, including rain. |
| Models Used | The statistical and empirical modes based on weather were used for this model. |
| Open Areas/Gaps/Issues | |  | | --- | |  |   the area-specific data base needs to be extended as data from the entire country will be required for wider application. |
| Results | |  | | --- | | The research could make the system better for yield forecasting by incorporating climatic data. |  |  | | --- | |  | |
| Potential Research Directions | Develop these models for other parts of the world and other crops. |
| Data Set Used | Weather and groundnut yield data from Andhra Pradesh, India. |
| Accuracy Metric | RMSE (LASSO Regression): - 491.603 kg·ha⁻¹,  RRMSE (LASSO Regression): - 20.68% |

4. <https://www.agriculturejournals.cz/pdfs/rae/2022/03/03.pdf>

**Models for Feature Selection and Efficient Crop Yield Prediction in Groundnut Production (Krithika et al., 2022)**

**Summary**: This paper assesses the most promising machine learning models used in predicting groundnut yield within the regions of Tamil Nadu. The research majorly puts up feature selection as its core methodology in making the models more accurate. The analysis shows LASSO and ElasticNet perform best while predicting crop yield using environmental data and irrigation data from Tamil Nadu.

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| **Aspect** | Details |
| Title | Models for Feature Selection and Efficient Crop Yield Prediction in Groundnut Production |
| |  | | --- | | **Research Focus** |  |  | | --- | |  | | Developing the best models, besides feature selection techniques towards prediction of yield of the groundnut |
| **Strengths** | Detailed model comparison has been focused on feature selection to make correct predictions |
| Key Findings | Both LASSO and ElasticNet have given good results to decrease the RMSE |
| Models Used | LASSO, ElasticNet, RF, MLR, ANN, SVR. |
| Open Areas/Gaps/Issues | |  | | --- | |  |    Only Tamil Nadu states; it could have generated good results in other areas as well if applied there. |
| Results | |  | | --- | |  |  |  | | --- | |  |   LASSO and ElasticNet seem to be doing much better than the rest; Random Forest and SVR do also fairly well. |
| Potential Research Directions | Apply similar techniques to other areas also and more advanced models as well. |
| Data Set Used | Groundnut production data from Tamil Nadu for the period 2007-17, including rainfall and irrigation statistics. |
| Accuracy Metric | MAE (Random Forest)- 360.96 (correlation matrix), 523.64(variance inflation factor), 637.78(backward elimination) |

5.<http://science.sdpublishers.org/id/eprint/2634/>

**Modeling and Optimization of Groundnut Production in Vijayapura District of Karnataka, India**

**Summary**: This study deals with the historical trend of groundnut production in Vijayapura district, Karnataka, India, for the purpose of developing and predicting future yields. By employing various statistical and forecasting models, the emerging trends in groundnut area, productivity, and production range from 1966-67 to 2020-21 are brought out. Analysis reveals that though ARIMA predicts an increase, the GAM model sustains a decline in the future production thus holding promise for agricultural policy and planning.

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| **Aspect** | **Details** |
| Title | Modelling and Optimization of Groundnut Production in Vijayapura District of Karnataka, India |
| **Research Focus** | This study focuses on the trends of groundnut production in the district of Vijayapura, Karnataka, to forecast future yields. |
| **Strengths** | Advantages Long-term data analysis from 1966 to 2021 Comprehensive usage of various forecasting models for confident predictions |
| Key Findings | GAM predicts that the future has groundnut output in decline, but ARIMA projects a near term increase. The study further provides key insights to policy in the agricultural sector. |
| Models Used | Statistical Models: Linear, Quadratic, Cubic, Exponential |
| Results | ARIMA, GAM, Conclusion GAM model fits best for forecasting the scenario in relation to yields as there may be a decline related to groundnut production in Vijayapura. |
| Open Areas/Gaps/Issues | There is inadequate incorporation of environmental and socio-economic factors. There is more dependence on the data from history without incorporating the technological changes that have happened over time |
| Potential Research Directions | Base on real-time climate and economic data. Technological Impacts on Yield Study |
| Data Set Used | Number of data sets Secondary data from 1966-67 to 2020-21, from various agricultural reports of Vijayapura district, Karnataka. |
| Accuracy Metric | RMSE- 11,127.60 (Linear), 9,871.29(Quadratic), 9,868.84(Cubic) |

6. <https://www.mdpi.com/2624-7402/5/4/106>

**An Artificial Neural Network for Predicting Groundnut Yield Using Climatic Data**

**Summary**:  
This study attempts to apply artificial neural networks (ANNs) for predicting groundnut yields as a function of climatic factors like rainfall and temperature in Sri Lanka. It selects three training algorithms, namely, Levenberg–Marquardt, Bayesian Regularization, and Scaled Conjugate Gradient to identify which performs better on yield predictions. The results show that natural logarithmic transformation data with the Levenberg-Marquardt algorithm produces the best result.

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| **Aspect** | **Details** |
| Title | An Artificial Neural Network for Groundnut Yield Predicting Using Climatic Data. |
| **Research Focus** | Predicting groundnut yield using climatic factors such as temperature and rainfall with the help of ANN models. Strengths |
| **Strengths** | |  | | --- | |  |  |  | | --- | |  |   Relative comparison of three ANN training algorithms. Efficient focus on climatic data affecting groundnut yield. |
| Key Findings | Levenberg–Marquardt algorithm showed better performance compared to all others in predicting groundnut yield. |
| Models Used | Models Applied Artificial Neural Network (ANN) Training algorithms: Levenberg–Marquardt, Bayesian Regularization, Scaled Conjugate Gradient |
| Results | The highest correlation and lowest MSE were achieved by the Levenberg–Marquardt algorithm with best-in-class predictive results for yield. |
| Open Areas/Gaps/Issues | Few data availability of specific years and regions. The socio-economic factors in yield prediction. |
| Potential Research Directions | Real-time climatic data and socio-economic factors in the model. More advanced ANN architecture like deep learning can also be explored. |
| Data Set Used | Climatic data of Sri Lanka that comprise temperature and rainfall, for different regions over a number of years. |
| Accuracy Metric | Mean Squared Error- 2.2859 × 10⁻²¹ |

7.<https://www.researchgate.net/profile/Thilina_Abekoon/publication/379652551_Utilizing_Climatic_Data_to_Forecast_Groundnut_Yield_with_Artificial_Neural_Network_in_Sri_Lanka/links/6612e9313d96c22bc77accba/Utilizing-Climatic-Data-to-Forecast-Groundnut-Yield-with-Artificial-Neural-Network-in-Sri-Lanka.pdf>

**Utilizing Climatic Data to Forecast Groundnut Yield with Artificial Neural Network in Sri Lanka**

**Summary**:  
This paper focuses on using an artificial neural network (ANN) based on climatic data to predict groundnut yield in Sri Lanka. The study analyzes multiple training algorithms and attempts to figure out the impact of minimum and maximum temperatures and rainfall on yield. According to the given research, the Levenberg–Marquardt algorithm, along with natural logarithmic transformation of data, maximally leads to an accurate forecast.

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| **Aspect** | **Details** |
| Title | Using Climatic Data to Predict Groundnut Yield Using ANN in Sri Lanka. |
| **Research Focus** | The paper mainly focuses on the prediction of groundnut yield using ANN, based on climatic data, which primarily includes temperature and rainfall, in several regions of Sri Lanka. |
| **Strengths** | Multiple ANN training algorithms have been applied. Climatic data usage has been adopted to predict the accuracy improvement of the approach |
| Key Findings | The Levenberg–Marquardt algorithm offers the best results in terms of high Pearson correlation and low MSE. - K-Fold cross-validation increases the correctness of the model. |
| Models Used | -Artificial Neural Network (ANN) - Training algorithms: Levenberg–Marquardt, Bayesian Regularization, Scaled Conjugate Gradient - K-Fold cross-validation |
| Results | Levenberg–Marquardt with natural logarithmic transformation yield data found the best prediction accuracy |
| Open Areas/Gaps/Issues | The study is limited to certain areas in Sri Lanka; thus, it may not be generalized in other areas - Other significant variables were excluded like soil conditions. |
| Potential Research Directions | Extend the study to cover more environmental factors such as data pertaining to soil and pests. Further testing in other geographies so that the model can be further validated in other locations. |
| Data Set Used | Climatic data comprising rainfall, minimum and maximum temperatures for a number of districts in Sri Lanka with data spread over several years. |
| Accuracy Metric | MSE (kg/ha)- 1.3371x(10^5) (Linear Model) |

8.<https://www.plantarchives.org/article/66%20DEVELOPMENT-OF-GROUNDNUT-YIELD-PREDICTING-MODEL-IN-RELATION-TO-WEATHER-PARAMETERS-IN-DHARWAD-DISTRICT,-KARNATAKA-INDIA.pdf>

**Development of Groundnut Yield Predicting Model in Relation to Weather Parameters in Dharwad District, Karnataka, India.**

**Summary:**

The paper attempts to compare several models over two seasons, Kharif and Summer, with a view to show the influence of weather variables like rainfall, temperature, and humidity on crop yield. The study thus serves the immediate purpose of providing insight to farmers and policymakers about the optimal crop management approach.

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| **Aspect** | **Details** |
| Title | Development of Groundnut Yield Predicting Model in Relation to Weather Parameters in Dharwad District, Karnataka, India |
| **Research Focus** | The impact of weather parameters on the development of groundnut yield was studied and, hence, models for yield prediction for both the Kharif as well as Summer seasons were developed. |
| **Strengths** | The usage of data is long term (41 years). - Comparison of different models for yield prediction across various seasons. |
| Key Findings | A Ways Rainfall and humidity were positively impacting the Kharif season. Temperatures negatively affected the Kharif yields. LASSO regression performed the best on summer yields; while K-NN was the best for Kharif. |
| Models Used | Linear Regression - Ridge Regression - LASSO - Elastic Net - Support Vector Regression (SVR) - K-Nearest Neighbor (K-NN). |
| Results | LASSO regression proved itself to be quite effective on Summer yields, whereas K-NN was best for Kharif season predictions. |
| Open Areas/Gaps/Issues | - No real-time data integration. -Few socio-economic factors were added to the yield prediction models. |
| Potential Research Directions | Avenues Used real time weather data for dynamic prediction. Economic factors need to be incorporated in the predictive model. Accuracy levels are bound to increase with more integration of data. |
| Data Set Used | Groundnut yield and weather data of Dharwad district, Karnataka from 1980-2021. |
| Accuracy Metric | RMSE-7.787(LASSO), 7.843 (ELNET), 7.801 (KNN)  MSE-60.632 (LASSO), 61.517 (ELNET), 60.838 (KNN) |

**9.**[**https://www.proquest.com/openview/35705f72e1eca7f6607fab422782b2d2/1?pq-origsite=gscholar&cbl=5444811**](https://www.proquest.com/openview/35705f72e1eca7f6607fab422782b2d2/1?pq-origsite=gscholar&cbl=5444811)

**Soil Nutrients Prediction and Optimal Fertilizer Recommendation for Sustainable Cultivation of Groundnut Crop Using Enhanced-1DCNN DLM**

**Summary:**

The study uses deep learning to predict the levels of nutrients in the soil and recommend the best fertilizers for sustainable groundnut farming. The Enhanced-1DCNN model performed better than conventional machine learning models in predicting the required nutrients for the soil.

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| **Aspect** | **Details** |
| Title | So, The Soil Nutrient Prediction and Optimal Fertilization Recommendation for Sustainable Groundnut Crop Cultivation Using Enhanced-1DCNN DLM |
| **Research Focus** | Deep learning-based soil nutrient prediction and fertilizer recommendation for sustainable groundnut farming. |
| **Strengths** | - Deep learning was applied to obtain a highly accurate result. The correct amount of needs of soil nutrients were predicted which have limited the excessive applications of fertilizers. |
| Key Findings | Enhanced-1DCNN was proved significantly better than other models like SVM, Naïve Bayes, and ANN with an accuracy of 99.78%. |
| Models Used | - Superior 1D Convolutional Neural Network (1DCNN), SVM, Naïve Bayes, ANN. |
| Results | -1DCNN model resulted in providing the best result for forecasting nutrient needs and fertilizer recommendation in soils. |
| Open Areas/Gaps/Issues | -Model geographically confined to only one geographical region, that is, Villupuram. Not used real-time soil and climate data |
| Potential Research Directions | - Help the model to move further to more regions Use real-time soil and climate data for real-time predictive analysis of nutrients and fertilizer recommendation. |
| Data Set Used | Soils nutrient data from Villupuram district Tamil Nadu, India. |
| Accuracy Metric | 99.78% (Precision, Recall, F1 Score, Recall) |

**10.** [**https://journals.riverpublishers.com/index.php/JRSS/article/view/20553/16575**](https://journals.riverpublishers.com/index.php/JRSS/article/view/20553/16575)**.**

**Prediction of Area and Production of Groundnut Using Box-Jenkins ARIMA and Neural Network Approach**

**Summary:**

The objective of this study is to compare the comparative effectiveness of the ARIMA and Feed-Forward Neural Network models in terms of the prediction of area and production of groundnut for India. It has also been identified that the estimates provided by the neural network models have improved upon that of the ARIMA models, especially for productions.

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| **Aspect** | **Details** |
| Title | Forecasting Area and Production of Groundnut by using Box-Jenkins ARIMA and Neural Network Approach. |
| **Research Focus** | ARIMA and Feed-Forward Neural Network model comparison for forecasting groundnut area and production in India. |
| **Strengths** | -  The present study uses long-term data for the period of 65 years. It compares statistical as well as machine learning models for higher-level precision in forecasting. |
| Key Findings | The ARIMA model with (2,2,2) proved consistent for the area but not so much for the production. Neural networks yielded better production forecasts than ARIMA. |
| Models Used | ARIMA, Feed-Forward Neural Network (FFNN). |
| Results | - FFNN yielded lesser error rates than ARIMA while forecasting the production. |
| Open Areas/Gaps/Issues | -ARIMA models do not perform well in split data . - No scope for inclusion of nonlinear factors like the effect of pest and sudden climatic changes. |
| Potential Research Directions | -  The inclusion of non-linear factors like that of pests. Hybrid models of ARIMA and neural networks to enhance the forecasted value. |
| Data Set Used | |  | | --- | |  |   Indian Groundnut area and production data for the period 1950-2014. |
| Accuracy Metric | R-square--Training-81%, Testing-60.2%(ARIMA) |

**11.** [**https://link.springer.com/article/10.1007/s00500-020-04946-0**](https://link.springer.com/article/10.1007/s00500-020-04946-0)

**Automatic Method for Classification of Groundnut Diseases Using Deep Convolutional Neural Network**

**Summary:**

This paper is proposing an automatic method for classifying groundnut diseases with deep convolutional neural networks, which uses plant image datasets to identify and classify the diseases with high accuracy. This technique might be useful in terms of early detection of diseases in agriculture.

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| **Aspect** | **Details** |
| Title | Automated Classification of Groundnut Diseases Using Deep Convolutional Neural Network. |
| **Research Focus** | Use of DCNN for groundnut disease classification. |
| **Strengths** | - Obtained an accuracy classification rate of 99.88% . Automated feature extraction does not require human input |
| Key Findings | - The proposed method, DCNN will classify at an accuracy of 99.88%, which is promising in the identification of a disease |
| Models Used | - Deep Convolutional Neural Network. |
| Results | - High performance in classifying groundnut leaf diseases, especially with a six-layer DCNN. |
| Open Areas/Gaps/Issues | - Misclassification when the appearing diseases are similar. |
| Potential Research Directions | Extend the model for identification of root and stem diseases as well Multisensor data integration to increase accuracy. |
| Data Set Used | Groundnut leaf image dataset by Plant Village. |
| Accuracy Metric | Deep Convolutional Neural Network- 99.88% |

12. <https://www.sciencedirect.com/science/article/pii/S2772375524001928>

**Groundnut Seed Defect Classification Using Ensemble Deep Learning Techniques**

**Summary:**

This study uses an ensemble deep learning model to classify defects in groundnut seeds by using VGG16 and InceptionV3 models. The research achieved high classification accuracy and also identified some of the common causes of seed defects that include physical damage, pests, and environment-related factors.

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| **Aspect** | **Details** |
| Title | Classification of Defects in Groundnut Seeds using Ensemble Deep Learning Techniques |
| **Research Focus** | Applying the ensemble deep learning models on the defects in the groundnut seeds. |
| **Strengths** | . Achieves high accuracy for classification - Used Generative Adversarial Network (GAN) to generate additional data that tries to enhance the performance of the models. |
| Key Findings | - The ensemble model combining VGG16 and InceptionV3 achieved a classification accuracy of 96.25%. |
| Models Used | - VGG16, InceptionV3, Generative Adversarial Network (GAN). |
| Results | - percentage obtained was accurate which could help in proper classification of seed defects. |
| Open Areas/Gaps/Issues | - Defects coming under other categories seemed to be the same. - Oil content not considered. |
| Potential Research Directions | - Other factors like oil content to be incorporated into seed classification. Better feature selection technique that would minimize chances of misclassification. |
| Data Set Used | Groundnut seed images from various farms. |
| Accuracy Metric | Ensemble model accuracy-96.25 % (GAN based) |

**13.** <https://www.sciencedirect.com/science/article/pii/S0889157523002223>

**Rapid classification of peanut varieties for their processing into peanut butters based on near‐infrared spectroscopy combined with machine learning.**

**Summary:**

The work "Rapid classification of peanut varieties for their processing into peanut butters based on near-infrared spectroscopy combined with machine learning" utilizes NIR spectroscopy together with machine learning algorithms in classifying the peanut varieties. This would classify varieties of peanuts that can be processed into peanut butter, hence moving forward to provide an efficient and cost-effective alternative to the conventional method. This research makes use of machine learning to predict key peanut butter quality traits based on peanuts spectral data and highlights the strength of the Random Forest model and similar models in improving classifications for peanuts.

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| **Aspect** | **Details** |
| Title | Rapid Classification of Peanut Varieties for Processing into Peanut Butters Using Near-Infrared Spectroscopy Coupled with Machine Learning. |
| **Research Focus** | The NIR spectroscopy coupled with the application of machine learning provides a basis for classification of peanut varieties in the efficient processing of peanut butter. The need is for rapid, cost-effective, and reliable evaluation. |
| **Strengths** | NIR spectroscopy is non-destructive and environmentally friendly. Several machine learning models have been compared within the study. |
| Key Findings | Achieved high accuracy of classification Main Conclusions\\tPeanut varieties were classified successfully with NIR spectroscopy and machine learning based on structural and roast characteristics of peanut butter. |
| Models Used | Partial Least Squares Discriminant Analysis (PLS-DA) Support Vector Machine (SVM) Random Forest (RF) |
| Results | - RF model was the best, with a sensitivity and specificity of >90%. - SVM and PLS-DA still good but less effective when the situation gets more complicated. |
| Open Areas / Gaps / Issues | - Limited validation on external data set which may require a bigger set. - An impact of roasting level on spectral data; further study is needed. |
| Potential Research Directions | - Increase the number of observations to enhance generalization of the models.  - Exploration of the influence of different processing conditions. Use of advanced ML methodologies such as deep learning. |
| Dataset Used | 40 types of peanuts along with spectral acquisition through benchtop spectrometer. - In total, the spectral samples are 200, which are analyzed within a wavelength from 12489.49 cm-1 to 3996.02 cm-1. |
| Accuracy Metric | Partial Least Squares Discriminant Analysis (PLS-DA)- 88%, 85%, and 86% respectively for cross validation (SENC, SPEC, and ACCU) |

**14.** [**https://kalaharijournals.com/resources/MAY\_114.pdf**](https://kalaharijournals.com/resources/MAY_114.pdf)

**Groundnut Production in Tamil Nadu Using ARIMA and Neural Network Analysis**

**Summary:**It discusses the analysis of groundnut production trends in Tamil Nadu, India. The authors of the paper try to make a projection of the yield of groundnut based on historical yield from 2003 to 2018 by using ARIMA and neural network models. The findings of the study give insight into how statistical models could enhance decision-making within agriculture production, especially for volatile crops like groundnuts. It presents an opportunity to mix both time-series forecasting and machine learning approaches toward better yield estimation.

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| **Aspect** | **Details** |
| Title | RIMA and Neural Network Analysis for Groundnut Production in Tamil Nadu. |
| **Research Focus** | Forecasts for groundnut production using the ARIMA and neural networks for improved crop management in Tamil Nadu. |
| **Strengths** | Good combination of ARIMA and neural networks; good data analysis. |
| Key Findings | Added both the ARIMA and the neural networks together that increased the accuracy of yield forecasts for groundnuts. |
| Models Used | ARIMA and Neural Network Techniques. |
| Results | Trend in the production was well predicted with a forecast showing fluctuations in yield. |
| Open Areas / Gaps | Open Spaces / Gaps Only in Tamil Nadu; it does not entail climate change as well as the economic variation. |
| Potential Research Directions | Contemplate exogenous variables such as climatic and economic variation; consider other advanced AI methods. |
| Data Set Used | Utilized Groundnut production in the state of Tamil Nadu (2003-2018) from MOSPI Statistical Yearbook of India. |
| Accuracy Metric | RMSE (ARIMA (2,1,1))- 1.152, 1.003,1.617 (Full model, Training, Testing) |

**Modeling Growth and Yield of Groundnut (Boote et al., 1992)**

**Summary:**

Crop growth simulation and yield prediction for groundnut is conducted in this work [1], particularly it discusses the PNUTGRO model and associated research on yield influencing factors by environmental factors such as row spacing, evapotranspiration, and temperature stress. Along with a new submodel for photosynthesis, especially transformed it into a good tool for agricultural decision-making. Data from experimental results of India; farm level test for four years under process are used.The limitations are it needs validation in more places, especially where the weather conditions are really extreme. It has produced 71% accuracy in pod yield variation.

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| Title | Modelling Groundnut Growth and Yield. |
| |  | | --- | | **Research Focus** |  |  | | --- | |  | | Development and improvement of PNUTGRO model for groundnut yield forecast. |
| **Strengths** | Environmental and management factors. |
| Key Findings | Works well to predict yields; improved for stress and evapotranspiration. |
| Models Used | PNUTGRO-version 1.02 with photosynthesis submodel hedgerow. |
| Open Areas/Gaps/Issues | Needs validation in more places, especially where the weather conditions are really extreme. |
| Results | Major overhauls in the model, very dynamically responsive to every input on a daily basis. |
| Potential Research Directions | Additional datasets, improvement in stress response accuracy. |
| Data Set Used | Data from experimental results of India; farm level test for four years under process. |
| Accuracy Metric | 71% (Pod Yield Variation). |