**Review of Literature**

**Analysis of rainfall data for agriculture literature survey**

**Gulati Ashok et.al. (2013)**, attempted to project the likely impact of robust monsoon rains of 2013 on the Agricultural Gross Domestic Product (GDP) growth in India. The model hypothesizes that the performance of agriculture in India depends upon (1) investments in agriculture (private and public); (2) agricultural price incentives; and (3) rainfall. A log-linear model fitted over 1996-97 to 2012-13 period can explain 95 percent of the variations in agri-GDP with all variables being statistically significant. The model also forecasts that the agri-GDP growth rate for the agricultural year (July-June) 2013-14 is likely to be between 5.2% and 5.7%. They also estimates that agri-GDP growth in 2013-14 is likely to be about three times higher than previous year. This growth in agri-GDP is likely to come mainly from oilseeds, pulses, cotton, and coarse cereals belt of central and western parts of the country, which is less irrigated and thereby more dependent on rain. It is very likely that any damage to kharif crops due to excess rainfall (with extended monsoons and cyclones) would be offset by a bumper rabi crop harvest, given that there is excellent soil moisture and ample surplus water in reservoirs.

**Olatayo. T. O. and Taiwo. A. I. (2014)**, have tried to predict rainfall on the basis of annual rainfall data of 31 years (1982 to 2012) of Ibadan South West in Nigeria.] According to T. O. Olatayo and A. I. Taiwo, the climate and rainfall are highly non-linear and complicated phenomena, which require classical, modern and detailed models to obtain accurate prediction. In order to attain precise forecast, they used a modern method i.e, fuzzy time series (FST) which belongs to the first order time-variant method. They also used other two fundamentally different approaches which are autoregressive integrated moving average (ARIMA) and the non-parametric method (Theil’s regression). The performance of the mode has been evaluated based on lowest value of mean squared forecast error (MAE), root mean square forecast error (RMSE) and Coefficient of determination. The study reveals that FTS model is an appropriate forecasting tool to predict rainfall, since it outperforms the ARIMA and Theil’s Regression.

**Karuiru Elias Kimani (2016**), have analyzed and forecasted precipitation in Keneya. They have used linear time series model of Seasonal Autoregressive Integrated Moving Average (SARIMA) and non-linear model of Time Lagged Feed forward Neural Network (TLFN). In their study, the values of diagnostic checking parameters including Mean Absolute Deviation (MAD), Mean Squared Deviation (MSD) and Mean Absolute Percentage Error (MAPE) have been found lower in TLFN than SARIMA. They conclude that the Time Lagged Feed forward Neural Network model has performed better than Seasonal Autoregressive Integrated Moving Average for forecasting precipitation

**Kamath R.S. and Kamat R.K. (2018)**, have analysed time series rainfall data during January 2006 to December 2016 of Iddukki district in Kerala to forecast rainfall. They used both linear and non-linear time series models namely the Autoregressive Integrated Moving Average (ARIMA), Artificial Neural Network (ANN) and Exponential Smoothing State Space (ETS). Their investigation shows that ARIMA model performed better than the other models. The analysis is based on Root Mean Squared Error (RMSE).

**Pongdatu. G. A. N. and Putra. Y. H. (2018),** in their study have compared SARIMA and Holt-Winter's Exponential Smoothing methods for time series analysis and forecasting of clothing sales in retail stores from 2013 to 2017. The SARIMA model yields more accurate results for short period time series data. However, Holt Winter’s Exponential Smoothing is more appropriate in forecasting seasonal time series data, whatever its pattern and trend be. In their study, they have compared the Mean Absolute Deviation (MAD) of the two models and have concluded that the model with smaller MAD, i.e., SARIMA (1, 1, 0) (0, 1, 0)12 is a better one.

**Kistner Erica et.al. (2018),** have found that the temperature and precipitation fluctuations across the Midwest directly impact quantity and quality of specialty crops (generally more sensitive to climatic stressors and require more comprehensive management compared to traditional row crops) and indirectly influence the timing of crucial farm operations. They have observed that increasingly variable weather and climate condition pose a serious threat to specialty crop production in the Midwest. Their results indicate that weather-induced losses vary between Midwestern states with excessive moisture resulting in the highest total number of claims across all states followed by freeze and drought events. They observe that the specialty crop growers are aware of the increased production risk under changing climate condition and have identified the need for crop specific weather, production, and financial risk management tools and increased crop insurance coverage.