Agricultural Standardized Precipitation Index (aSPI) in Drought Characterization: A Case Study in Jaffna Peninsula in Sri Lanka

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The agricultural activity highly influenced by the rainfall and related meteorological parameters. This study utilized the method introduced by Food and Agriculture Organization (FAO) to estimate the effective rainfall (Ep) of Jaffna for the period of 1985 to 2019 to explain the drought condition of Jaffna using aSPI at 1, 3, 6, 9 and 12 months' time scale (aSPI 1, aSPI 3 aSPI 6 aSPI 9 and aSPI 12 respectively) and to check its effectiveness. The performance of the aSPI was evaluated using correlation coefficient (r) with the yield of red onion and green chilli and standardized precipitation index (SPI) values. Analysis shows that the annual effective rainfall has no trend in long term but there were seasonal and short term variations found. Most of the years falls under below average value (862 mm) of Ep. The near normal condition was exceeding the normal distribution pattern (68.2%) in all time scales. The very wet condition was highly deviates from normal distribution value of 4.4% in aSPI 3 (6.8%) and aSPI 9 (5.1%). The October, November, December and January months can be recorded as rainy months. The number of wet event increases with years in *Maha* and vice versa during *Yala*. aSPI 9 shows less amount of moderately wet condition. Moderate drought and severe drought conditions were less in aSPI 1. Eight hydrological years 1987-88, 1991-92, 1992-93, 1995-96, 2000-01, 2006-07, 2013-14 and 2018-19 can be denoted as dry years. Around 60% of the years falls under wet condition. The effective rainfall has low degree of correlation with the yield of red onion (*Maha* (0.17) and *Yala* (0.15)) and moderate relation with green chilli (0.31 for both season). The r value of different time period is similar in SPI and aSPI except 6-month period where high correlation with the yield of both crops was observed. From these findings it can be said that in this study area the monthly rainfall event was highly fluctuating and the value is higher than the normal distribution probability of the rainfall. The wet and dry event during the period of 1985 to 2019 was showed cyclic pattern with different rate of change. That is there was some variation or shift in the onset of rainfall and considerable impact on agriculture and other sectors also can be noted. But there was enough water to the cultivation of Chilli and red onion if the cropping calendar is properly schedule by considering the shift or change in the onset of rainfall in this region and aSPI is suitable indices to explain the drought in this region.

Keywords: Drought, Effective rainfall, Agricultural standardized precipitation