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Comparison of Agriculture Land Area and Production Capacity between Tamil Nadu and Andhra Pradesh and Cross Checking the Effect of Rainfall Pattern in Agriculture

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Research Article

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ABSTRACT

As India is an agriculture country and agriculture is the backbone of economics, it is necessary to cross check the agriculture production capacity against the climate change impact on rainfall event and increasing rate of urban population. In this study, analyzing the trends on rice cultivation area, rice, pulses and grams. The importance analyzing only the land area of agriculture trend is because of both study area Tamil Nadu and Andhra Pradesh plays top ranking in rice production. Then cross check with rainfall event if it results decreasing trend. The agriculture data of 15 years and rainfall data of 117 years are used.

INTRODUCTION

Increasing of world population density results increasing the demand on food materials. To overcome this issue, the agriculture activities and production capacity has to be increase. The expected world population by 2050 is 9.7 billion that will again increase the pressure on agriculture in future. As India is an agriculture-based country and agriculture system is the backbone of India, so the world needs support through our agricultural practices and efficiency. Domestic rice agriculture system was spread to Indian Sub-continent in c.B.C.500 and the development takes place between (c.500 BC – 500 AD) exactly during the reservoir tank construction [1]. The development of rice agriculture started form Neolithic to well system but now due to urbanization and decreasing agriculture paddy field there is no development in the agriculture system, and handling different practices results decreases in rice production. 50% of Indian agriculture is rainfed based and low-income farmers cultivate most of them. Increasing trend on Indian annual rainfall happened between 1901-1950 and from then significant decline, rainfall is detected. Also the forecasting rainfall from 2015 to 2030 resulting decline rainfall for the whole India. The precipitation trends for six cities of India and found that 4 out of 6 cities having negative trends in seasonal rainfall and number of rainy days [2]. In addition, pointing out that this is because of increasing the anthropogenic emissions due to increase in population and urban area. The source of agriculture is rainfall, climate condition, soil fertility, land cover and land type. Compare to North India, South India resulting playing an important role in Indian Summer Monsoon precipitation during 1971-2017 and also the forecasting analysis of precipitation shows there will be an extreme precipitation takes place in South India compare to North India.

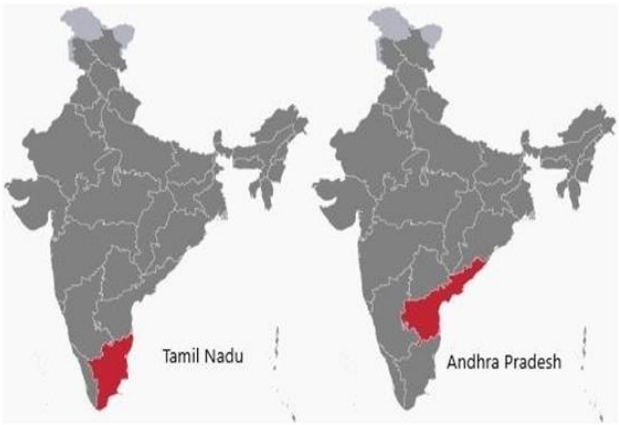
As Tamil Nadu is our own state, comparing the rainfall pattern with nearby state Andhra Pradesh is considered in this study. The reason of choosing Andhra Pradesh for comparison is that they are having similar ranking in production of rice, species and grains. Due to the recent climate change through rainfall pattern, change in temperature, increasing of urban area may affect the agriculture yield. 100 years Indian monthly rainfall and 7 years district wise monthly rainfall of are used to understand the rainfall pattern between intra-districts of Jammu Kashmir and capitals of J and K and Himachal Pradesh [3]. Two Indian states 117 years of rainfall data to cross check whether climate change impact on rainfall decreases the agricultural activity. The farmers observed that there is changes in weather patterns and the frequent extreme events affecting both crops and livestock like seasonal growing crops results only less yield because of lack in rainfall and the livestock finding difficulties to find water and greeneries. The regional climate change impact in Europe, resulting decreasing in yield potential and decreasing crop water requirements because of increasing in temperature level as per most scenarios. Impacts through temperature on crop production are higher than rainfall is revealed in Kenya. Coupled model inter comparison project CMIP5 model identified that the future rainfall event will be increased slightly in western part of the country and largely in north eastern and southern region of the country but there is 65% rise in temperature. The hotspot of yield reduction through a composite indicator and found that Asia's agriculture system on rice and maize production will be get impact through the climate extremes through droughts and heat waves. Disruption in crop production in Ghana through change in rainfed causes food insecurity, joblessness and poverty. Zone having least rainfall is attributed due to deforestation, increases of pollution, no space for drainage channels and construction of banks of lakes besides water bodies.

To avoid the above world facing problems on agriculture, it is mandatory to understand the rainfall pattern of the study area and the analyze the trends on data of total agricultural area and production capacity of different species. If the problems continues, it will directly affect the food material demand then it results in crisis on food for the future generation. This study will help to identify the linkage between rainfall pattern of 117 years and trends on agriculture data [4]. Similarly compared the rainfall pattern of Kerala with other states of India and found that except summer season rainfall, all other three seasons rainfall events on similar between Kerala and other states. Therefore, the positive rainfall event of Kerala in summer resulting the impact of rainfall of the whole country. Analyzed and compared the behavior of monsoon rainfall of India and Odisha at larger scale, regional scale and sub-regional scale and found that there is no correlation.

MATERIALS AND METHODS

Both Tamil Nadu and Andhra Pradesh lay on the southernmost part of the Indian Subcontinent. As per 2011 census, Tamil Nadu and Andhra Pradesh population is 72,147,030 (Density of 1400/sq mi) and 49,386,799 (Density of 800/sq mi). From this baseline data of population density, it is clearly shows that urbanization is extending by decreasing the agriculture land due to higher population rate (Figure 1).

Figure 1. Study Areas: Tamil Nadu (Left) Andhra Pradesh (Right).



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The agriculture data of total agriculture land area and production yield of rice, grains and pulses gathered from the report of "Agriculture Statistics at a glance-2018" and "2016" and the rainfall data collected from India water portal [5].

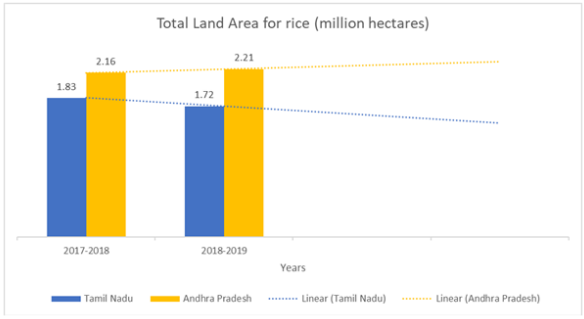
RESULTS AND DISCUSSION

As rice is our largest consumption food for both study areas.

Total land area for rice

Total land area of rice for the both the states is figured out and linear forecast of the both the states data are predicted (Figure 2).

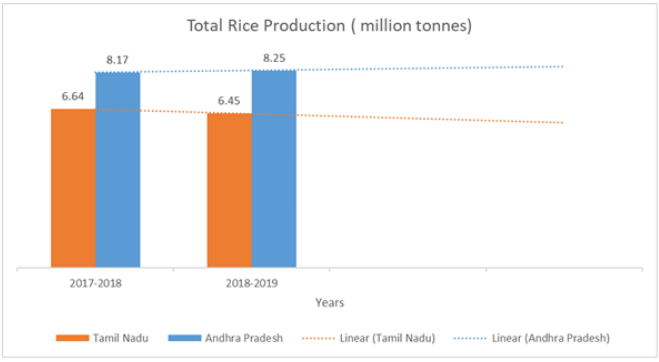
Figure 2. Rice cultivation area for Tamil Nadu and Andhra Pradesh.



Total rice production

Total rice production for the both the states is figured out and linear forecast of the both the states data are predicted (Figure 3).

Figure 3. Amount of rice production in Tamil Nadu and Andhra Pradesh.



Total pulses yield

Total pulses yield for the both the states is figured out and linear forecast of the both the states data are predicted (Figure 4).

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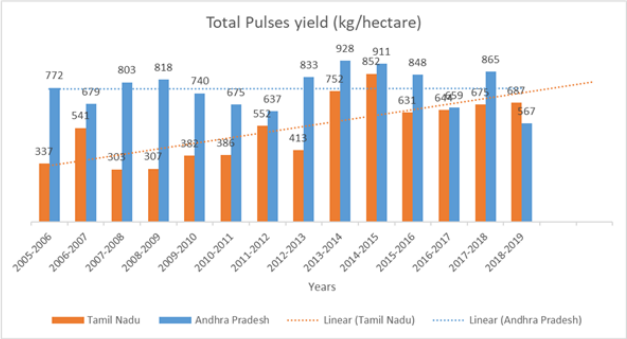
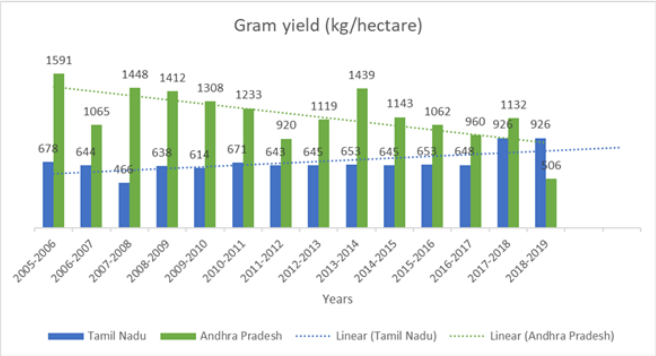
Figure 4. Amount of total pulses yield in Tamil Nadu and Andhra Pradesh.



Gram yield

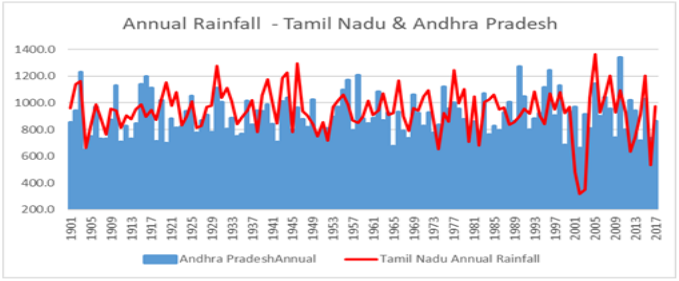
Gram yield for the both the states is figured out and linear forecast of the both the states data are predicted (Figure 5).

Figure 5. Amount of gram yield in Tamil Nadu and Andhra Pradesh.



From the above data of total area, for rice production, production capacity of rice, pulses and grams, it shows the land area for rice cultivation in Tamil Nadu is decreasing may be because of the effect of urbanization the yield capacity of pulses and grams increase in both past available data and linear forecasting graphs. Therefore, the reduction of land area and rice production is not only the reason of urbanization. Hence, it is required to cross check the both monthly and seasonal rainfall patter of both states in the available 117 years (1901 to 2017) rainfall data and predict the future rainfall through linear forecasting (Figure 6).

Figure 6. 117 years annual rainfall of Tamil Nadu and Andhra Pradesh.



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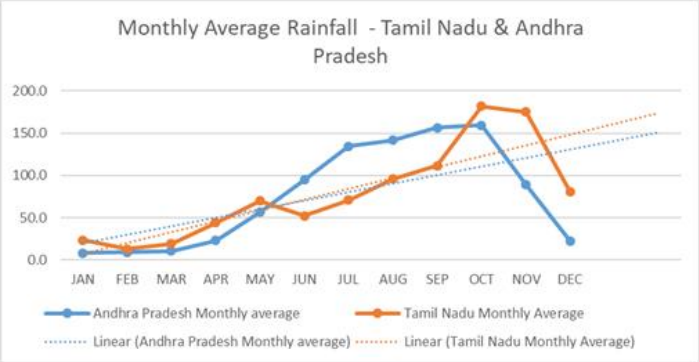
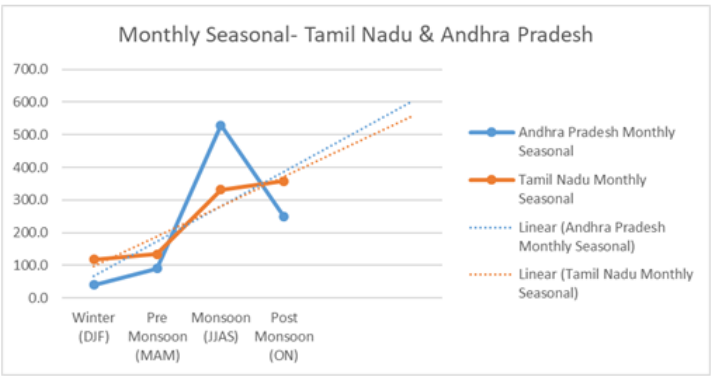
In Annual rainfall data, the amount of received rainfall in Tamil Nadu seems higher than Andhra Pradesh (Figure 7).

Figure 7. 117 years monthly average rainfall of Tamil Nadu and Andhra Pradesh.



The average monthly rainfall graph shows that rainfall from January to May and October to December having a higher value of rainfall for Tamil Nadu and the balance month June to September having lower value of rainfall compare to Andhra Pradesh (Figure 8).

Figure 8. 117 years monthly seasonal rainfall of Tamil Nadu and Andhra Pradesh.



The monthly seasonal rainfall graph shows that other than Monsoon season (JJAS), Winter season (DJF), Pre-Monsoon season (MAM) and Post Monsoon (ON) Tamil Nadu receiving higher volume of rainfall compare to Andhra Pradesh.

CONCLUSION

The rice cultivation area and yield of rice, grains and total pulses is analyzed and linear forecasting graph of both Tamil Nadu and Andhra Pradesh is analyzed. The results shows that there is decreasing trend in rice cultivation area and rice production for Tamil Nadu and increasing trend in grains and total pulses production for Tamil Nadu compare to Andhra Pradesh. Then the reason of decreasing rice production is cross checked with annual, monthly and seasonal rainfall of 117 years rainfall pattern (1901-2017) and found out that only Monson season having lower volume of rainfall in Tamil Nadu than winter season (DJF), Pre-Monsoon season (MAM) and Post Monsoon (ON) rainfall volumes.

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The reducing of agriculture area causes decreasing the rice production volume in Tamil Nadu, if it continues then the volume of grains and other pulses will results in reduction. Compare to Andhra Pradesh, only one season results lack of rainfall in Tamil Nadu so it is recommended to water authority of Tamil Nadu to collect and store the water receiving from the rainfall event in winter season (DJF), Pre-Monsoon season (MAM) and Post Monsoon (ON) to use for agriculture system in Monsoon season.

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