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Role Of Internet Of Things And Data Analysis On An Emerging Threat; Production (Cultivation) Of Curcuma Longa (Local Variety) In Krishnagiri District

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Abstract

In Indian agriculture having more scope for food productions but in real time due to some natural disaster it fall down. So using ICT technologies have to improve the cultivation. The data were Collected from three varieties of Curcuma longa from 3 districts of turmeric growing area in Tamil Nadu. The Preparation of Hydroalcoholic extracts of Curcuma longa. Then analysis of phytochemicals -3 varieties Curcuma longa to make the estimation of Total Phenols and Total flavonoids of 3 varieties. In this estimation process Curcumin impact on factors such as geographic localization, harvest time and climate conditions etc. on Phytochemical composition of turmeric rhizome.

Keywords: *IoT, ICT, Data Science, Annova, T-Test*

I. INTRODUCTION:

Turmeric is a rhizomatous herbaceous perennial plant (Curcuma longa) of the ginger family.Around 92-95% of the turmeric produced in India is consumed within the country. Total annual production of cured turmeric stands at1,50,000 tonnes. Remaining 5-8% is exported yielding foreign exchange ranging from 40 to 110 million rupees annually.India accounts for about 80 % of world turmeric production.Turmeric is of high value because of its high curcumin content.

In India turmeric has long history of its usage as food and medicine for centuries.It is a traditionally used in AYUSH for various diseases. Curcumin a polyphenol, being the principle active ingredient belonging to curcuminoids family, other minor curcuminoids present included methoxy curcuma and bisde methoxy curcumin. Lot of research has been conducted on turmeric-curcumin, throwing evidence that curcumin has a very promising

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anti-inflammatory and anticancer activities.This has created renewedscientific interest in its potential to prevent and treat the disease.

Antioxidant and anti-inflammatory properties are the two primary mechanisms that explain the majority of the effects of curcumin on the various health conditions. Curcumin exhibits greatpromise as a therapeutic agent and is currently in human clinical trials for diseases like cancer, colon cancer, psoriasis and Alzheimer'scondition.It is reported to exhibit severalpharmacological, microbial and other medicinal properties. Thus we can conclude Curcumin has received worldwide attention for its multiple health benefits.

To date, the majority of curcumin studies in humans have been in populations with existing health problems. Perhaps this is because studies on healthy people can be challenging in that benefits may not be as immediate and measurable if biomarkers are normal at baseline. Therefore, following subjects over time may provide the best insight into any potential health benefits in healthy people. Certain potential difficulties scientist face is, curcum in exhibits relatively low oral bioavailability in humans and rats and may undergo extensive intestinal metabolism.

With a view to evaluate the objectives of the study, it was considered desirable to have an idea of the findings of some earlier researches and the methods adopted for arriving at the same. Such a review of literature connected with the main objective of the study, it is hoped, would provide a basis either for confirming the earlier findings or for contradicting the same and thereby to suggest points of departure for further studies. Consistent with the objectives of the study, the review of literature is presented in this chapter under the following heads: 2.1 Growth and instability analysis 2.2 Allocative and technical efficiency 2.3 Cost and returns 2.4 Marketing channels 2.5 Trend analysis 2.6 ARIMA technique 2.7 Export performance 2.8 Market integration 2.9 Production and post harvest constraints

The present study of impact in factors such as geographic localization, harvest time and climate conditions etc. oncultivation in terms of chemical composition and activity of turmeric rhizome.

II. Materials and Methods

IOT plays a vital role in this research, IOT sensors are capable of sensing and provided that information of agriculture farming condition is systematically. Here we designed proposed system of IOT and digital farming(smart agriculture) by using automation technology(like industry4.0 technology). This system makes use of WSN that collects all data from various heterogeneous sensors then deployed at different nodes and send the sensors data through the wireless protocol(via WIFI).

The system is powered by Arduino uno processor, and contains several heterogeneous sensors such as heat sensors(Temperature sensor), Moisture sensor, soil(water level sensor) , motors and GPRS connected modules. The IOT based farming monitoring system process it checks the heat, soil - water level, humidity on air and soil moisture level. It sends SMS(send mail services) alert on the phone about farming situation. Here water level goes down, system automatically starts the DC motor - water pump. If the temperature goes high level fan gets starts. This related contition will displayed on the LCD display as well as website module.

Fig 1: Experimental set up in lemon farming

Collection and Preparation of Plant Material

3 cultivars of C. longa rhizomes (C1,C2,C3), were collected from ,

1. Murukanapalli Village, Shoolagiri (Tk), Krishnagiri (Dist), Tamil Nadu- **C1**

2. Omalur Village, Salem Dist, Tamil Nadu- **C2**

3. Sathyamangalam Village, Erode District-**C3**

in the month of May-June were washed thoroughly in tap water to remove soil particles followed by sterile distilled water. They were cut into small pieces, shade dried and ground to fine powder. Dried and powdered samples were Soxhlet extracted with methanol for 48 hours and the methanol was evaporated to dryness using water bath set at 60°C. After that, the residues were weighed and stored at 4°C until use.

Preparation of Standard Solution

Gallic acid and Quercetin 10mg were accurately weighed into a 10 ml volumetric flask, dissolved in methanol and the solution was made up to 10 ml with the same solvent [1mg/ml].

Estimation of Total Polyphenols:

The Total Polyphenol Content (TPC) of the turmeric extracts was estimated spectrometrically according to the Folin-Ciocalteu method. (Singleton et al, 1999) and adopted by Afroz et al, 2014 . Briefly, 0.4 mL of the extract (0.25 mg/mL) was mixed with 1.6 mL of 7.5% sodium carbonate solution. Then, 2 mL of 10-fold diluted Folin-Ciocalteu reagent was added, and the final reaction mixture was incubated for 1 h in the dark. The intensity of the blue-colored complex was measured at 765 nm using a PD-303S spectrophotometer (APEL, Japan). The total polyphenol content present was determined as Gallic acid equivalent (GAE) (6.25, 12.50, 25.00, 50.00, 100.00, and 200.00 μg/mL, = 0.9970) and was expressed as g of GAE/100 g of turmeric.

Determination of Antioxidant activity

In order to investigate the antioxidant properties of the examined extracts ferric ion reducing antioxidant power (FRAP) assay was used. The method for determining the ferric reducing ability has been taken in modified form from the method used by (Sakat et al., 2010).

DPPH and ABTS assay

DPPH and ABTS assay were performed according to WONG et al. The absorbance decreases after30 min of the solution of DPPH at 518 nm were recorded following the addition of thetested samples

ABTS assay.

ABTS assay were performed according to RE et al. The absorbance decreases after 6 min of the solution ABTS+• in ethanol 734 nm, were recorded following the addition of thetested samples

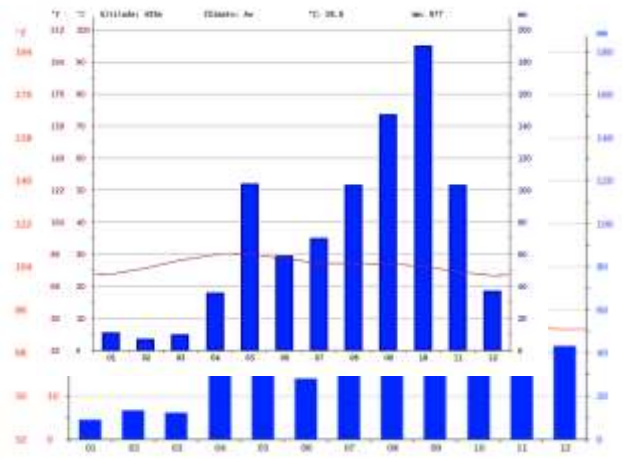
FRAP Assay:

FRAP reagents was freshly prepared by mixing acetate buffer (300 mM, pH 3.6), TPTZ solution (10 mM) and FeCl3 (20 mM) in the ratio of 10:1:1. Each turmeric extract sample (10µl) of 50 mg/ml was added to 3ml of freshly prepared FRAP reagent and stirred and after 5 minute absorbance was measured at 593 nm, using FRAP working solution as blank. Thereafter, samples were allowed to stand for 4 minutes and absorbance is again taken at 593 nm. The results were expressed in mM/100 gm.

Estimation of Curcumin:

About 1g of the sample was refluxed with 75ml acetone for 1 hour after which it was filtered and made up to 200ml. From this further 1ml was taken and made up to 100ml in a standard flask. The flasks were wrapped with dark coloured paper and dark conditions maintained since curcumin is light sensitive. The UV spectral reading for this solution was recorded under 420nm. A UV spectrum was recorded for standard curcumin. The obtained absorption of samples was compared with the standard value and percentage curcumin in samples calculated using the formula:

Curcumin (%) = [Ds*As/100*Ws*1650] *100



where,

Ds - dilution volume of the sample (ie., 200*100 = 20000ml)

Ws - weight of the sample taken in grams

As - absorbance of the sample 1650 - standard value calculated by experts

III. Results and Discussion:

Analysis on Climatic conditions of 3 regions and the Data sources will be: https://en.climate-data.org.

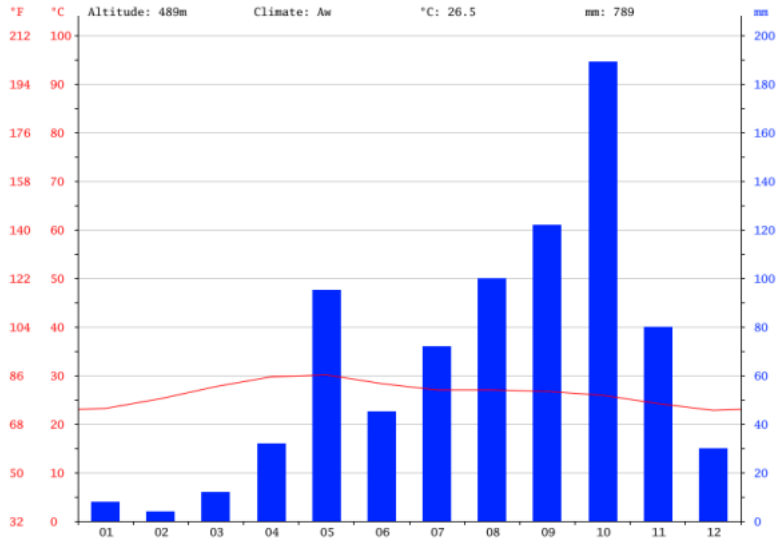
Climatic conditions of erode:

The climate here is considered to be a local steppe climate. During the year there is little rainfall. The Köppen-Geiger climate classification is BSh. The average temperature in Erode is 28.3 °C. About 700 mm of precipitation falls annually.

CLIMOGRAPH ERODE

Krishnagiri

The climate is tropical in Krishnagiri. The summers are much rainier than the winters in Krishnagiri. This climate is considered to be Aw according to the Köppen-Geiger climate classification. The temperature here averages 26.5 °C. Precipitation here averages 789 mm.



Climograph of Krishnagiri.

Salem:

Salem climate is classified as tropical. The summers here have a good deal of rainfall, while the winters have very little. This location is classified as Aw by Köppen and Geiger. The temperature here averages 26.8 °C. The average annual rainfall is 877 mm.

Climograph of Salem

All the data are analysed used the Annova tool. It has been observed that the climatic conditions have significant impact on curcumin content of turmeric rhizome. Even though the rainfall and temperature does not contribute more on differences, the altitude is identified as the absolute factor for the increase in curcuminoids content in turmeric.

Previous reports have indicated that the curcumin content varies between the different lines of this species. These results suggest that the difference of curcumin content among the various lines of C. longa was caused byhybridization and introgression with other Curcuma species.

Because of diverse weather conditions and soil type the curumin content was found to be varied for samples collected from different geographical source, more deeper studies related to agronomy like soil conditions, water quality etc., may give us more clear understanding on the active factor of the essential oil from turmeric. The results of the study disclose that, in hydroalcoholic extract of turmeric samples collected from Erode, Salem and Krishnagiri, The sample collected from Krishnagiri, have comparatively higher percentage of curcumin than the other samples.

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