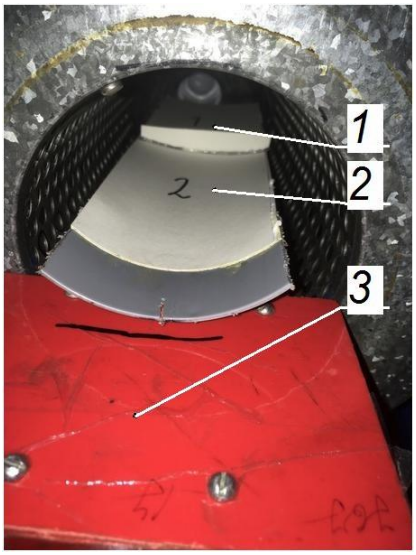

Рис. 1 Разделение семян на три фракции

1 – сектор лотка для первой фракции; 2 – сектор лотка для второй фракции; 3 – семяприемник для третьей фракции

По результату разделения семян на две фракции, в первую в среднем попадало 9 из 10 легких семян, 7,33 средних и 3,33 тяжелых. Соответственно во вторую фракцию 1 из 10 легких, 2,67 средних и 6,67 тяжелых.

В результате разделения семян на три фракции в первую в среднем попадало 7,33 из 10 с легких семян, 3,67 средних и 1,67 тяжелых. Во вторую фракцию попадало 2,33 легких семян, 5,33 средних и 3,33 тяжелых. А в третью фракцию в среднем попадало 0,33 легких семян, одно среднее и 5 тяжелых.

Исследуемый метод сепарации показал себя как рабочий. Путем регулировки силы вакуума и его выравнивания на рабочей поверхности можно добиться значительных улучшений качества сепарации.

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УДК: 623.437.42

DETECTING THE VEGETATION HEALTH SITUATION OF TARTUS FORESTS (SYRIA) AND THE SPATIO-TEMPORAL DISTRIBUTION OF AGRICULTURAL DROUGHT

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Abstract: *The study aims to monitor the vegetation health situation and determine the drought spatial and temporal distribution, through using vegetation health index VHI for the time series 2001 - 2021. The results show a good health situation in general for the forest. The years 2011, 2015 and 2020 were in excellent condition, as more than 91% of the forest was following the class of no drought, and the rest of the years witnessed some decline in the health of the vegetation cover, indicating an agricultural drought, most of it were less than 30% of the forest, except 2001, which was the most deteriorating, about 70% of the forest followed the different drought classes.*

Keywords: *Forest, Drought, Vegetation health, VHI.*

Drought can occur in different ways and at different time intervals, Syria has been exposed to several droughts some of these waves were described as very severe, especially the drought of 2001, 2008, and 2017. (Doun, 2017; Karmoka *et al*., 2019) especially in the northern west part of the country. Drought is one of the most important challenges facing the Mediterranean forest ecosystems (Santonja *et al*., 2017), in order to monitor the forests droughts events, several indices have been developed allowing to describe its temporal and spatial extent. vegetation health index (VHI) as a vegetation-based index used in a very vast scale (Masitoh and Rusydi, 2019) because it can reflect the inner factor related to the plants to describe the drought reasons (Kogan, 2001). Forests cover less than 3% of the total area of Syrian territory; therefore, it has a big importance as a valuable natural recourse of the country. These forests were a subject of a degradation and serious changes under the impact of global climate change. and lately the forests located in the Syrian coast region Witnessed a rapid depletion of forest cover during the conflict that broke out in mid-2011. where the area of dense forests decreased by 9.2% between 2010 and 2020 (Mohamed, *2021*). All of these wrong practices lead to the permanent loss of this natural resource and the consequent increase in the amount of carbon in the atmosphere, accelerating global warming and land degradation, with significant environmental, social and economic impacts. affect. Observing the vegetation cover and determining its health conditions has become easier than before as a result of the emergence of modern technologies, such as remote sensing techniques, which is characterized by comprehensiveness and saving cost and effort compared to traditional methods.

The study aims to monitor the forest health situation and determine the drought spatial and temporal distribution, through using vegetation health index VHI from MODIS which derived from EVI and LST for the time series 2001 – 2021. Thus, a greater understanding of the factors that influence changes in forest patterns and their spatial extent over time will be made possible by the information

that can be gleaned from the Detecting the Vegetation Health Situation. This will then assist in formulating and assessing plans for managing forest resources.

The study area is forming the forests of Tartus Governorate. Between latitudes (34° 35′ 58") and (35° 12′ 05") N and between longitudes (35° 51′ 13") and (36° 17′ 20") E. with a total area of about 27344.64 hectares (Fig. 1).

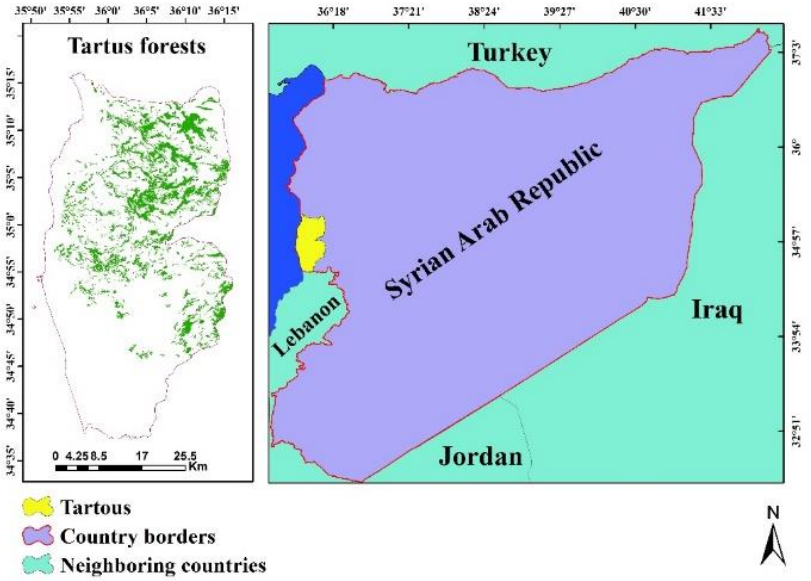

Fig. 1: Location map of study area.

It follows the Mediterranean region climate which characterized by the mild temperature all year round, and the temperature difference becomes smaller once you get out of the sea. Forests cover includes types of conifers such as *Pinus* sp. and types of broadleaves, the most common are *Quercus* sp.

The vegetative indices used were derived from MODIS satellite data, which were downloaded from the USGS website. to calculate VHI from EVI and LST (Kogan, 1995) through calculating Vegetation Condition Index (VCI) and Temperature Condition Index (TCI) for April in each year from 2001 to 2021, because it corresponds to the vegetation growing season in the study area.

1. Data collection stage:

All MODIS images of MOD13Q1 product representing EVI and MOD11A2 product representing land surface temperature LST were uploaded within a time series extending from 2001 to 2021.

2. Image processing stage:

a) Conducting the process of carrying out the process of specifying the projection (utm zone 37N) for all scenes according to the global projection system UTM_WGS84, after that the area representing the study area was extracted according to administrative boundaries approved by the Ministry of Local Administration.
b) Adjusting the values using the scale factor: EVI and LST images contain raw data that must be corrected using a special correction factor which is 0.001 for EVI image and 0.02 for LST image, so that the data of each image is transformed to reflect the values of these indices.
c) VHI index calculation:

VHI index calculation by applying the model of its equation within ERDAS imagine software.

$$VCI = (\text{EVI} - \text{EVI}min / \text{EVI}max - \text{EVI}min) * 100$$

$$TCI = (\text{LST}max - BT / BTmax - BTmin) * 100$$

$$VHI = 0.5 * VCI + 0.5\, TCI$$

d) The stage of VHI image classification of the study area by applying a model which determine the five classes of drought vulnerability, resulting from the calculation of the VHI index (Table. 1).

Table 1

Classes of VHI drought Index.

Drought class	VHI Value
No Drought	> 40
Mild drought	30 – 40
Moderate Drought	20 – 30
Severe Drought	10 – 20
Extreme drought	< 10

The model of the VHI class was applied and the forest VHI maps of the study area were produced to determine the drought distribution.

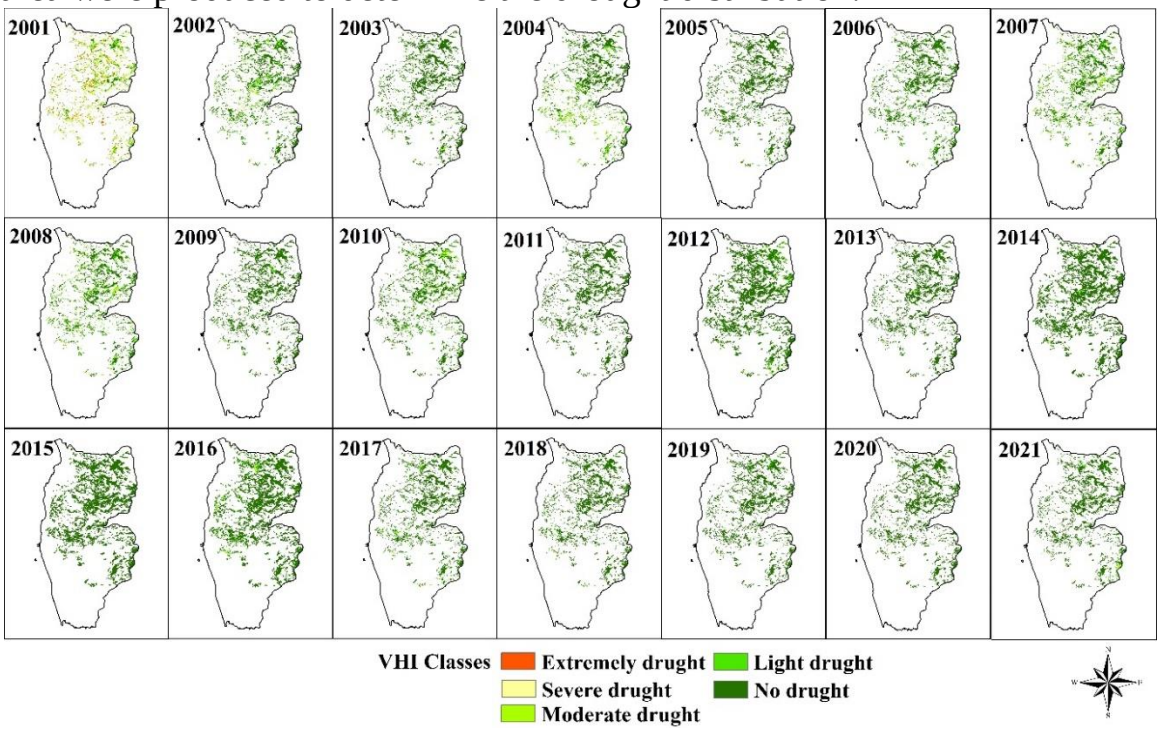

Fig. 2: VHI maps of the study area.

From Figure (2) we note that the class of high values of VHI index appeared clearly in the 2001 and 2004 years, indicating the presence of severe drought and therefore an unhealthy vegetation condition, meaning that the forest cover was exposed to stresses caused by Various reasons, including a lack of rain water and high temperatures, which caused a decline in its vitality. Also, drought class appeared in 2008, which was described as one of the most severe years of drought

that the country has experienced in several decades, while the rest of the years, especially 2011, 2015 and 2020, were characterized by the dominance of green colors expressing class of Mild drought or No drought, which refers to the stability of vegetation health conditions and the absence of serious stresses that may cause a decline in the vitality of the forest cover and its deterioration.

As for the spatial distribution of drought, the area of the five classes of VHI index was calculated, and the results showed that the largest area recorded for the class expressing no effect on drought was in the years 2011, 2015, and 2020, with a percentage of the total area amounting to 91.92%, 91.49%, and 91.81% respectively. As for the area affected by Extreme drought class, the year 2001 recorded the largest area within these classes, with rates of 25.95% of the total studied area, 24.25% for Severe Drought class and 24.79 for Moderate Drought class. Thus, 2001 is the driest year according to the VHI index, followed by the years 2004 and 2008, which recorded 21.76% and 20.56%, respectively, of the total area of drought classes Moderate, Severe and Extreme drought. This indicates that large areas of forest have experienced a variety of stresses in these years, were associated with reduced rainfall and fire outbreaks, leading to reduced forest vitality and health.

Conclusion Most of the years, the forest cover was in good condition, except for some decline in 2001, 2004 and 2008 years, which indicates the adaptation of the forest cover to the conditions of the site. The forest cover recovers in the following year, and the state of decline does not continue for long periods. this indicates that forests growth in the study area is affected by several different factors, firstly surface temperature, vegetation internal condition, precipitation, fires and human activities. VHI could identify vegetation canopy stress, so it could be used as drought assessment indicator index. Understanding vegetation status condition and its response to environment changes was quite important to ensure natural resources safe.

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Секция: «Современные тенденции энергосбережения в АПК»

УДК 658.5

СОВЕРШЕНСТВОВАНИЯ НЕ АВТОМАТИЗИРОВАННОГО ПРОИЗВОДСТВЕННОГО ПРОЦЕССА НА ОСНОВЕ ЦИФРОВОЙ МОДЕЛИ

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***Аннотация:** Работа посвящена применению цифровых инструментов, при совершенствовании производственных процессов.*

***Ключевые слова:** Качество, процессный подход, цифровизация, моделирование, промышленное производство.*

Современные технологии позволяют повысить точность проводимых мероприятий в различных областях и достичь ожидаемого результата [1, 2, 3]. Применение сквозных цифровых технологий совместно с процессным подходом позволяет повысить эффективность процессов с наименьшими затратами [4, 5].

В настоящие время любое предприятие принято рассматривать как совокупность процессов, данная концепция является многократно проверенной и устоявшийся. Впервые данный подход был реализован в третьей версии стандартов ИСО серии 9000 (2000 г.) и приход цифровых систем еще больше подчеркнул его преимущества.

Поскольку совершенствование невозможно без четкого понимания текущей ситуации, изначально необходимо провести обследование