



# USAMVB Timisoara YOUNG PEOPLE AND AGRICULTURE RESEARCH

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## USE OF REMOTE SENSING IMAGES IN CROP MONITORING CASE STUDY: SOYBEAN CROP

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**Abstract:** The study used remote sensing images in order to analyze and describe the monitoring process for soybean crop. Soybean, which has been the subject of this study, is a culture of particular economic importance due to its many uses. It is used in human nutrition, in the production of animal feed, but also as a raw material for some industries Worldwide in the production of soybean vegetable oil is the second largest after the palm. The satellite images were achieved by the PlanetScope satellite system, images in 4 spectral bands: RED, GREEN, BLUE and NIR, with a 3 m spatial resolution, that show the dynamics of this crop over the period analyzed. The study was carried out over a total time interval (T) of 121 days, from 27.03.2020 to 24.07.2020. The parcel analyzed in this research is part of Experimental Didactic Station of BUASVM Timisoara and it is located in Timis County and it has approx. 55 hectares.

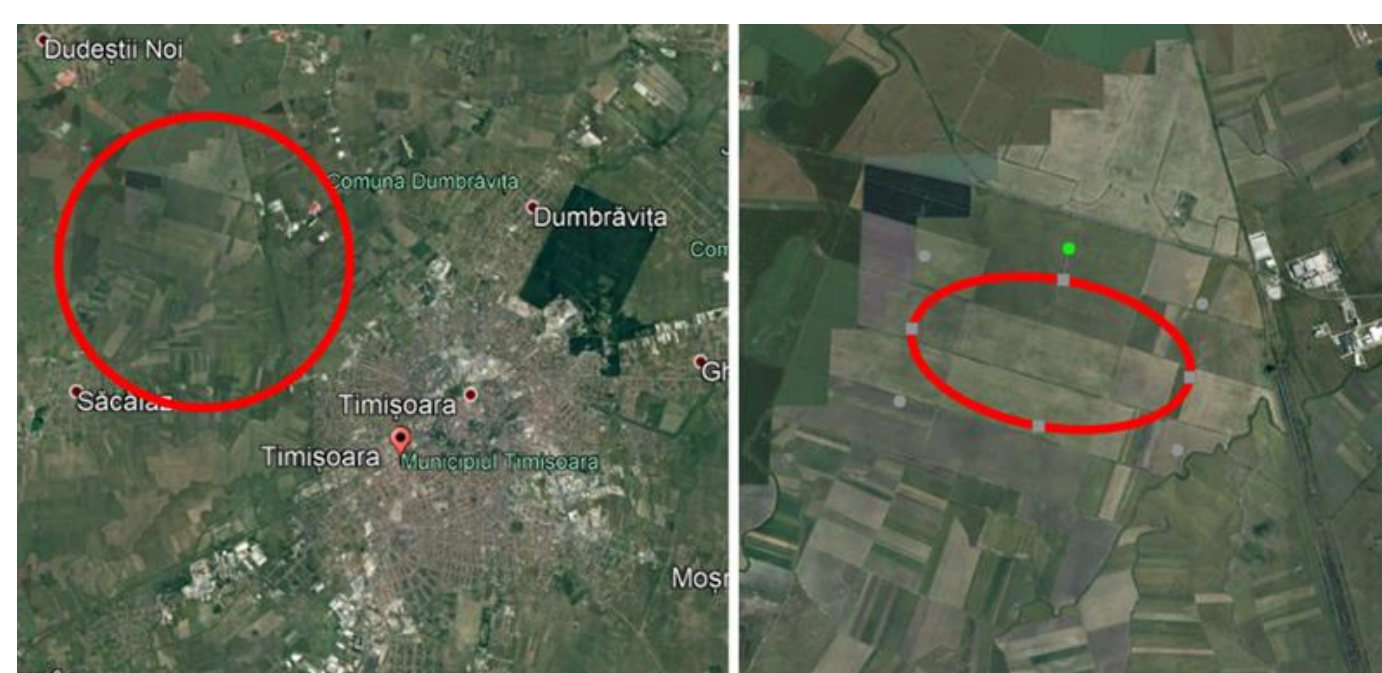
### • Introduction

Remote sensing images are increasingly used for crop assessment, forest area monitoring, protected areas or real-time risk tracking. In addition to remote-sensing images, large-scale use is also made of precision farming with UAV equipped with a multi-spectral camera to monitor agricultural crops and detect real-time problems that may occur in certain conditions in agricultural crops.

The spectral bands of remote sensing images contain specific information and the combination of these results in a series of new information, which is complex and highly safe for the characterization of the vegetation covering and in particular, of agricultural crops.

### • Material and method

The study area analysed in this paper is part of the Experimental Didactic Station of BUASVM Timisoara, in Timis County. In this study, an attempt was made to monitor a plot grown with soya of approx. 55ha, the approximate geographical coordinates being 45°47'28"N and 21°09'13"E.

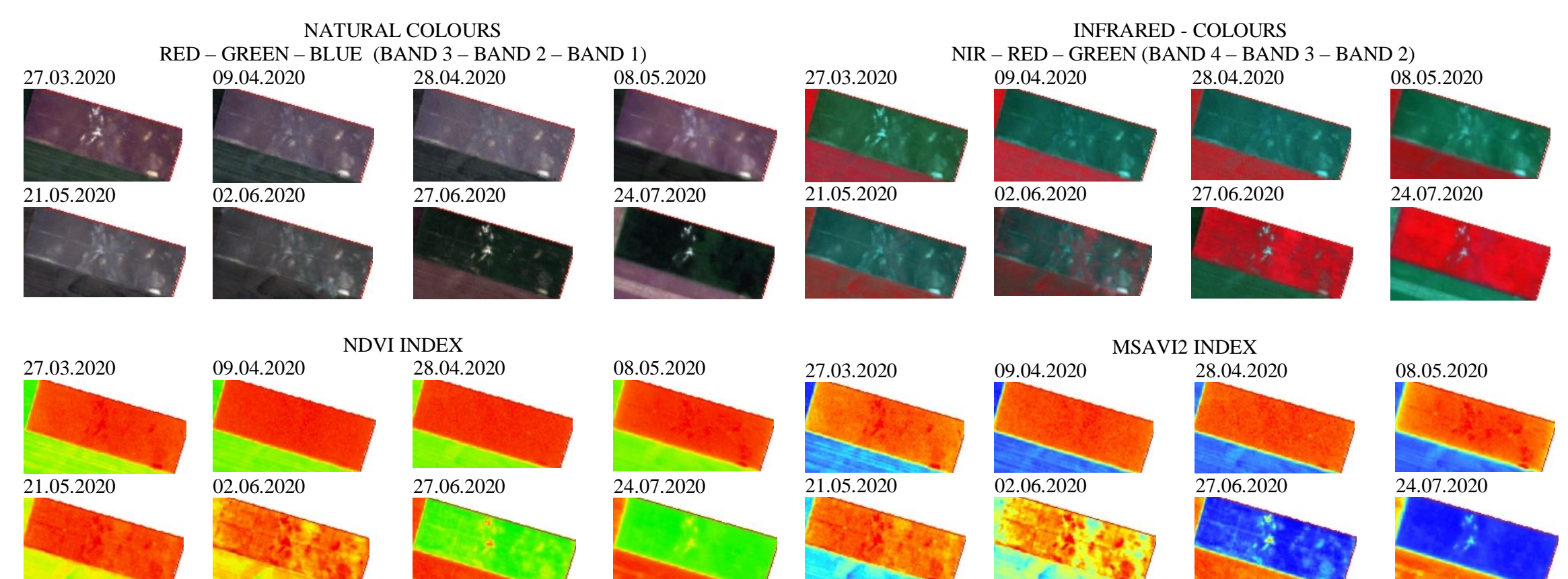


Location of the Study Area

In this study, in order to monitor soybean cultivation, satellite images were acquired from the PlanetScope remote sensing system between 27.03.2020 and 224.07.2020, downloaded on the Planet Labs portal (PLANET TEAM) Thus, 8 satellite scenes were taken over and processed for the calculation and interpretation of 2 useful vegetation indices in such monitoring, namely, the Normalized Difference Vegetation Index (NDVI) and The modified soil-adjusted vegetation index (MSAVI2).

### • Results and discussions

The images taken from the Planet Scope system on the www.planet.com portal have undergone pre-processing using special software (Erdas Image), and then on the basis of the spectral bands of this system, 2 combinations of spectral bands were made, useful in monitoring soybean cultivation, namely, The combination of RGB, respective the combination of NIR RED GREEN.



The values of the MSAVI and NDVI indices for soybean cultivation

	T	MSAVI	NDVI
D1 27.03	0	0.141133	0.079338
D2 9.04	14	-0.0632	-0.02589
D3 28.04	33	0.027648	0.01781
D4 8.05	44	0.134101	0.078556
D5 21.05	57	0.10198	0.056823
D6 2.06	69	0.214767	0.123082
D7 27.06	94	0.667391	0.508017
D7 24.07	121	0.82435	0.704807

### • Conclusions

From the remote sensing images of the PlanetScope system, a monitoring was carried out based on 8 satellite scenes from March to July 2020 on a soya cultivated plot. From remote sensing images, 8 RGB combinations and 8 NIR-Red-Green combinations were made that show the dynamics of this crop over the period analysed. Graphs were also developed and the variation functions of the NDVI index in relation with time and MSAVI2 index were determined. Based on the calculated index values, cluster grouping was possible depending on the time of acquisition of remote sensing images under statistical security given by the Cophenetic coefficient.

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