

Evaluation of the influence of biologically active substances on the physiological processes of soybean plants with the use of multispectral camera and unmanned aerial vehicle

The influence of biologically active substances on the physiological processes of soybean plants with the use of a multispectral camera and unmanned aerial vehicle (UAV) has been assessed in the article. The researches were carried out on soybean variety MK 100, cultivated on the experimental field of the All-Russian Scientific Research Institute of Soybean in 2018, Sadovoe village of the Amur region. The goal of the research is to assess the influence of biologically active substances on the physiological processes of soybean plants using “DJI Matrice 100” UAV and “Micasense Red Edge” multispectral camera and with laboratory analysis comparison in various growth stages.

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1. Introduction



Evaluation of the influence of biologically active substances on the physiological processes of soybean plants.

Plots

Control

Pulsar, 0.8 l/ha **herbicide**

BioLarics, 20 g/t

BioLarics, 20 g/t + Pulsar, 0.8 l/ha

ExtraCor 20 g/t

ExtraCor 20 g/t + Pulsar, 0.8 l/ha

growth stimulants

2. Methodologies

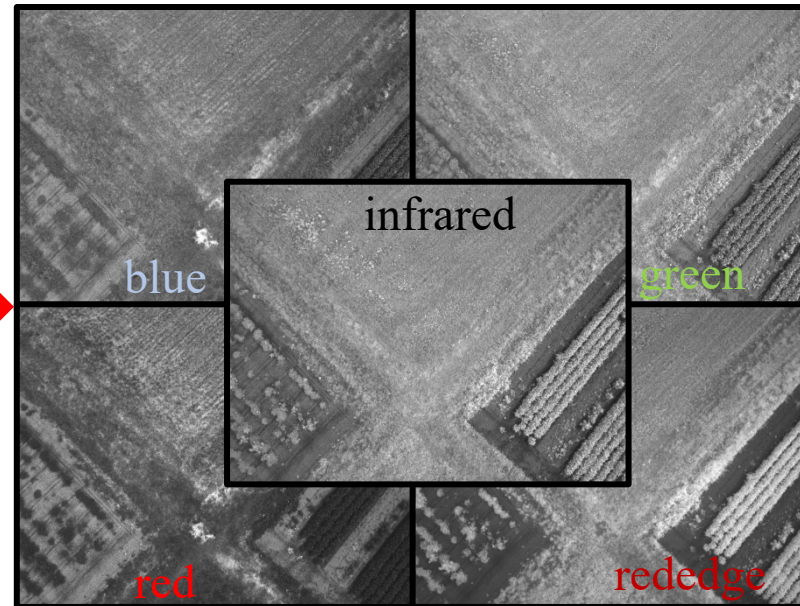
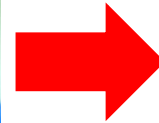


DJI Matrice 100,
4-rotors UAV

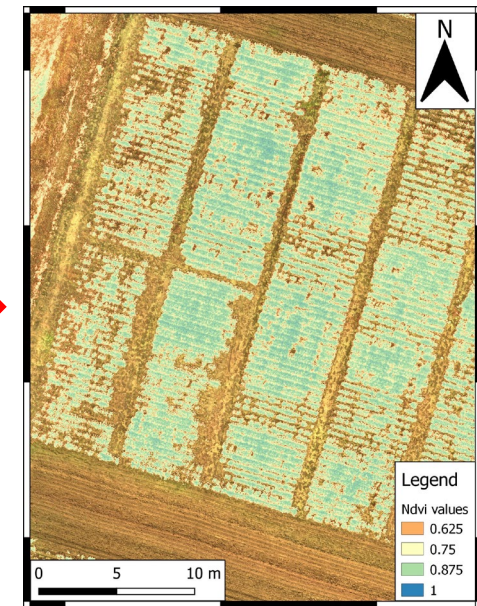
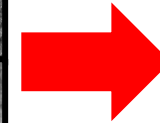
Workflow of the image analysis in the
experiment



Micasense RedEdge,
5 bands camera



Raw data,
Processing via Pix4D



QGIS software,
allows to analyse and
visualise obtained data

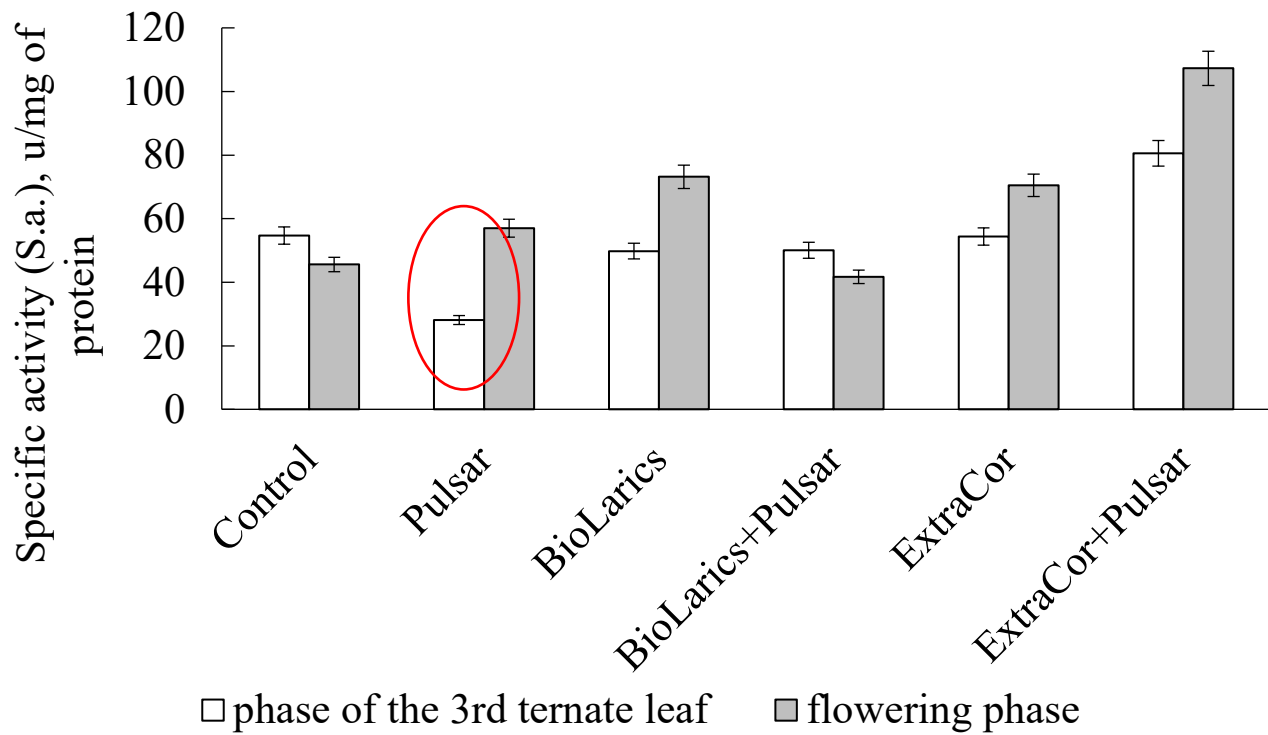
3. Results and discussions

Evaluation of the influence of **active substances**



Pulsar herbicide in the phase of the third ternate leaf hurt soybean plants, as evidenced by a decrease in the specific activity of the enzyme.

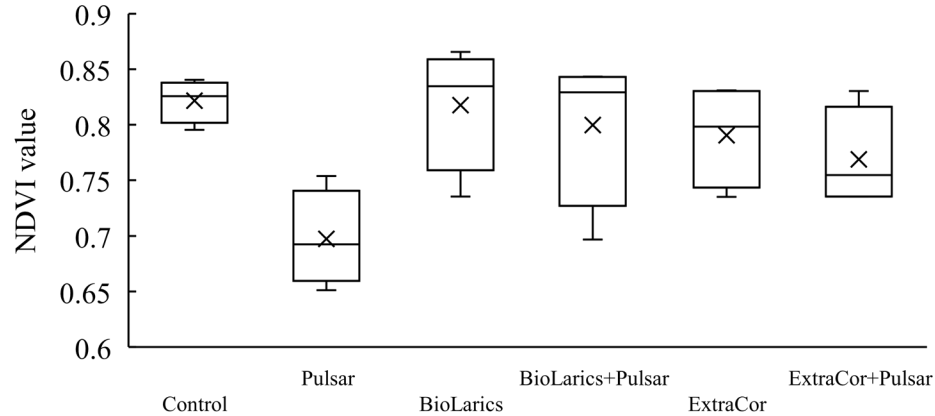
Herbicide plots (Pulsar)



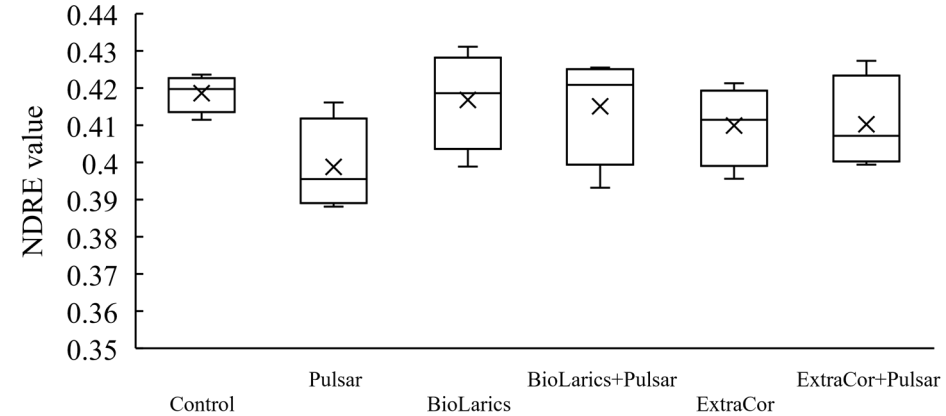
Multispectral analysis also confirmed the poor development of vegetation in the plots with the herbicide.

4. Results and discussions

NDVI values for each plot

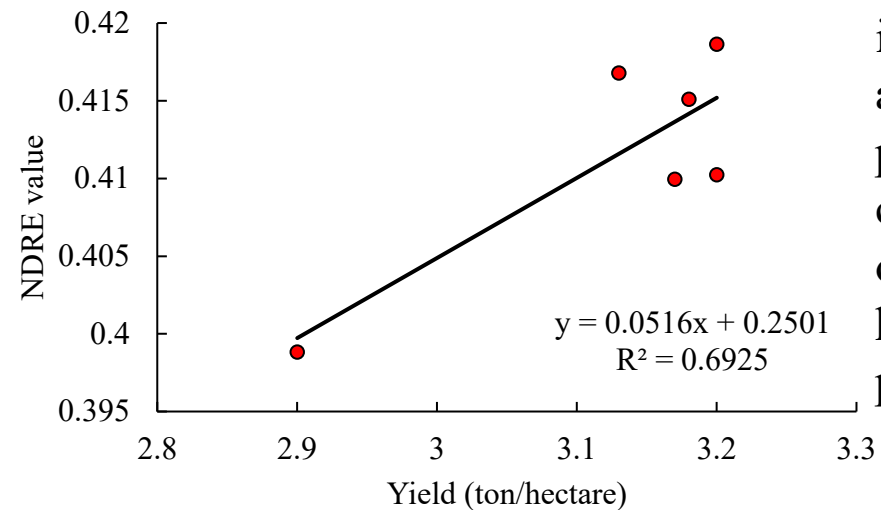
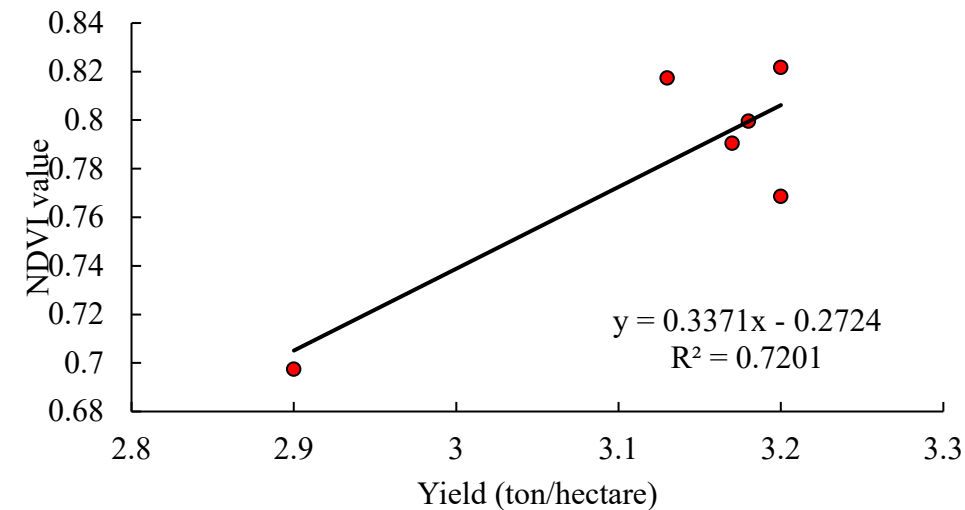


NDRE values for each plot



The use of UAV with a multispectral camera made it possible to assess the **physiological processes of soybean** crops in microplot trials and showed the possibility of determining the state of vegetation.

Relationship between yield and NDVI values of soybean



Natural preparations BioLarics and ExtraCor, influencing the intensity and direction of physiological processes, contributed to the reduction of the toxic load of Pulsar herbicide on soybean plants.