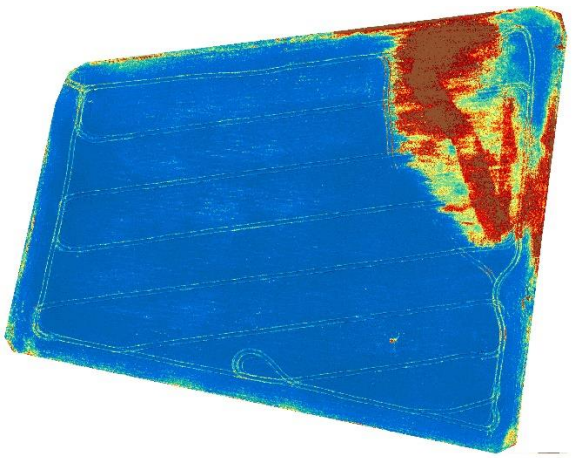
Winter Wheat Assessment and Treatment
CASE STUDY

Winter wheat grown on 2.8 hectares
HIGÉN +99 treatment study



June 2021

Winter Wheat Assessment and Treatment

Study of growing winter wheat on an area of 2.8 hectares, of which
1 hectare has been treated with the HIGÉN +99 product distributed by Ecowian Magyarország Kft.
In June 2021

Winter wheat is being produced on an area of 2.8 hectares outside the town of Jászapáti. The field concerned lies parallel with Main Road 31, adjacent to a number of other arable fields. (Pictures 1, 2, 3)

I carried out monitoring drone surveys of the area alone and with the help of Agron Kft., with the consent of the owner of the land. Orthomosaic generated from RGB camera images (photo images taken in the visible light spectrum) multispectral camera images (photo images taken in the invisible light spectrum), and its analysis with the AGRONMAPS analytical software.

A 1-hectare part of the 2.8 hectare field under winter wheat the crop was treated with the Hygien +99 product. For better transparency, the treated area is a 1-hectare patch right next to the main road. The aim was to assess the efficacy of the product and the plants' response to the treatment.

I surveyed the area twice during the project, first on 8 June 2021 and it was followed by drone-spraying of the HIGÉN +99 product, in a 20% solution, with ion-exchanged water as diluent, used as vehicle.

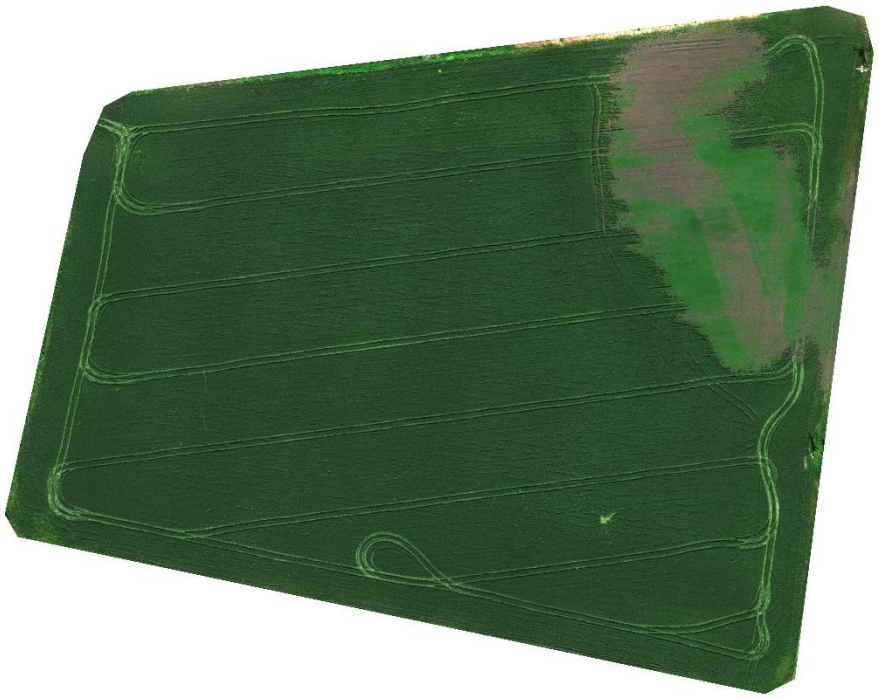
Aerial photos, suitable for visual assessment, were taken of the entire area with an RGB camera, along with stress condition survey (Pictures 4 and 5) as well as chlorophyll level assessment (Pictures 6 and 7) with a multispectral camera.

After the application of the product, on 22 and 27 June 2021, I carried out repeated visual assessments of the entire area. The vegetation's stress and chlorophyll level assessments were also completed.

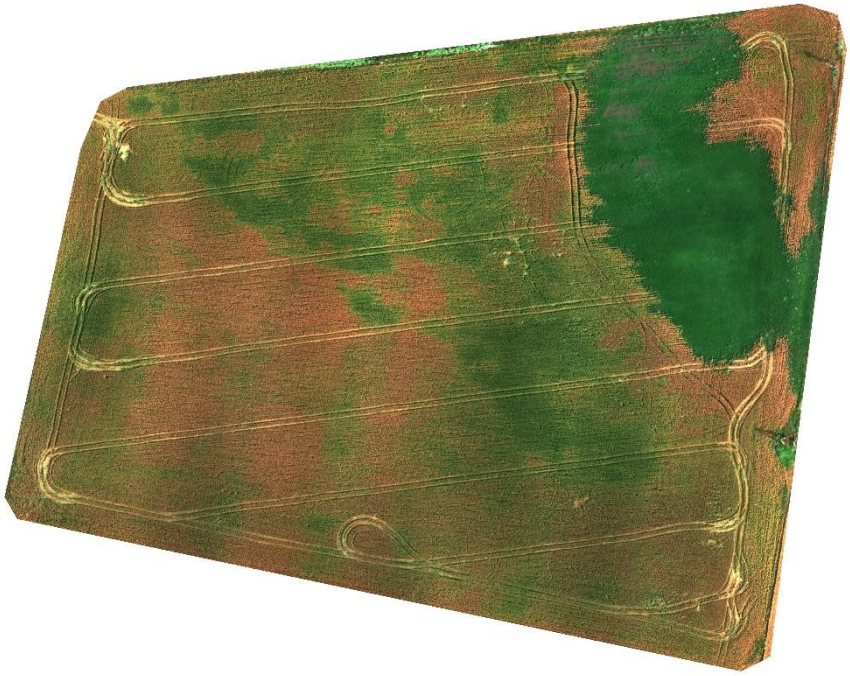
Picture 1

One week before the first survey, the vegetation was treated with a fungicide solution in the entire field in response to massive rains during the last two weeks preceding the application and the significantly increased risk of fungal diseases, caused by heat spells between the rainy days.

Visual survey:



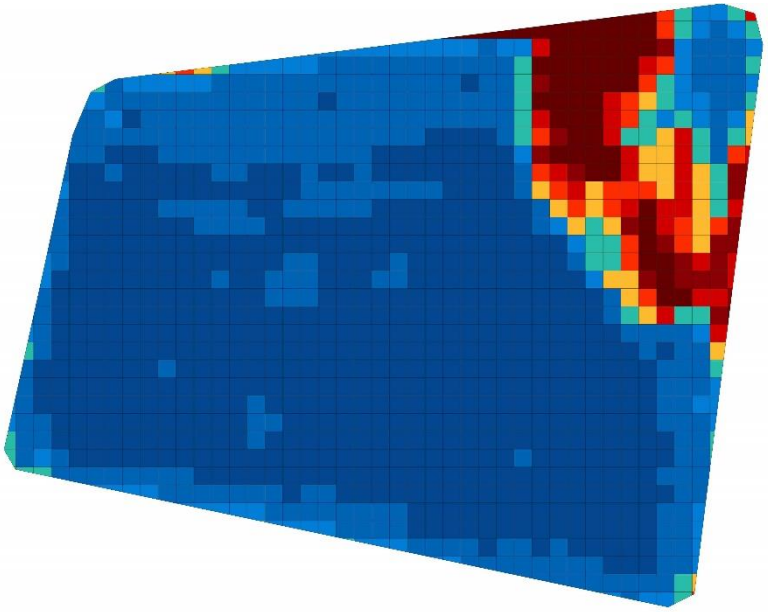
8 June 2021



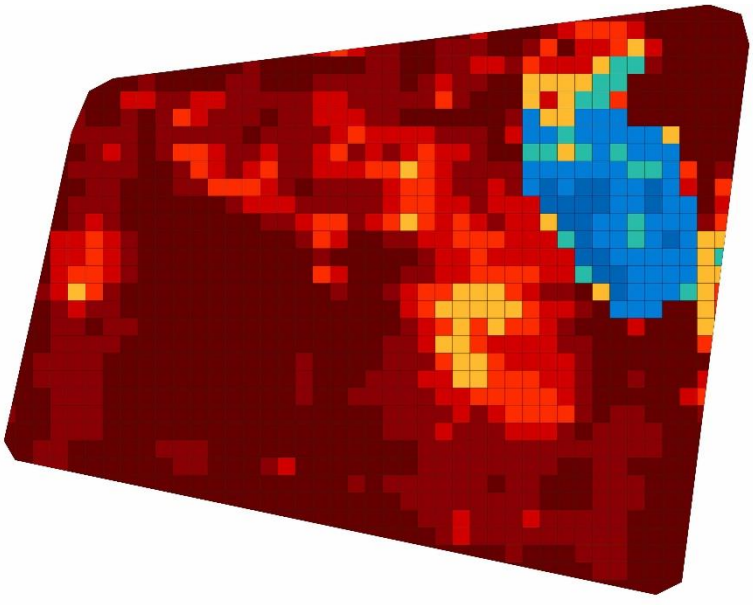
27 June 2021

The first two pictures were taken before the HIGÉN +99 treatment, clearly showing the vigorous vegetation and a bare saline patch in the upper right-hand part of the picture. The second picture was taken two weeks after the treatment, clearly showing progress in the ripening process. The HIGÉN +99 product was delivered along the full width of the upper part of the field. No material difference is visible in the entire area, apart from the fact that treated plants appear to be less mature than those in the untreated part of the field.

Stress assessment:



8 June 2021

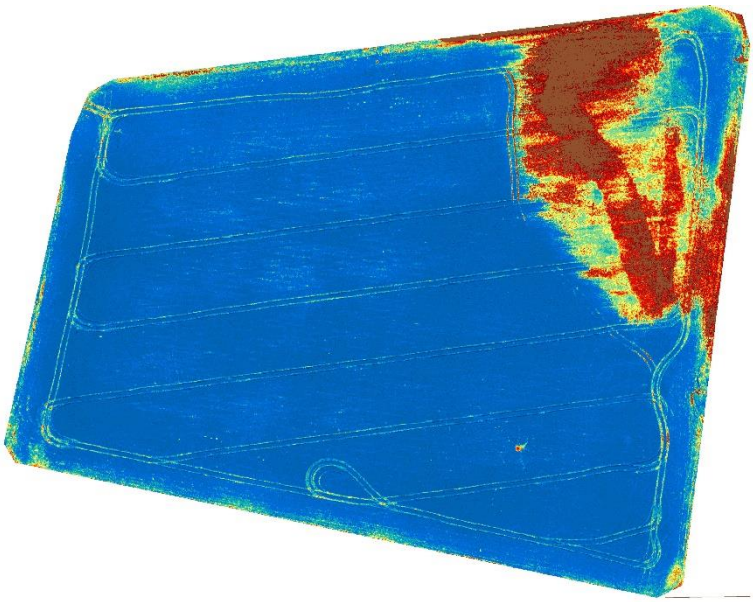


27 June 2021

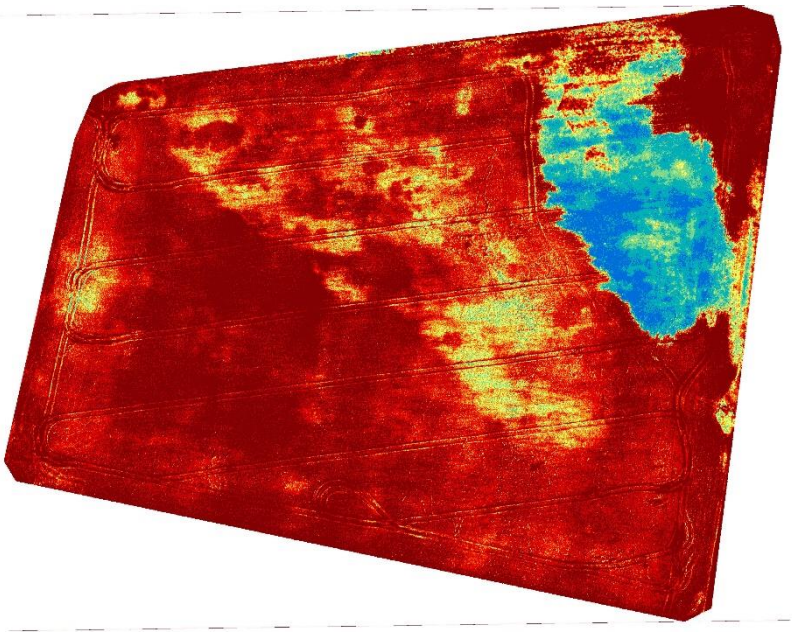
The first image generated with the multispectral technique shows a homogeneous vegetation in the area, with no focal point indicating an imminent outbreak of plant disease. It also shows how markedly the barren saline patch differs from the rest of the field.

The second image reflects a dramatic change in the vegetation's stress condition, which is attributed to approaching full maturity of the plants. While the first image does not, the second one does show a visible difference (in the form of a lighter-coloured patch) in maturity between the treated and the untreated parts of the field.

Chlorophyll level assessment:



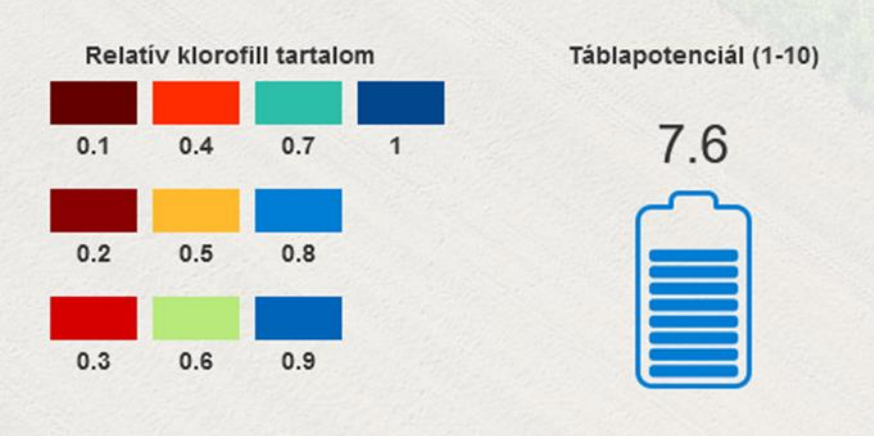
8 June 2021



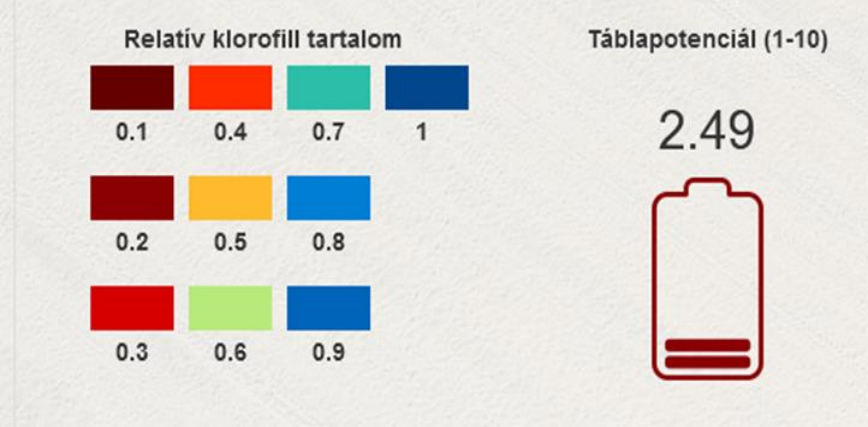
27 June 2021

Chlorophyll is a molecule found in green plants which absorbs solar energy and coveys it to be used in the processes of synthesis taking place in plant cells. It is an extremely vulnerable compound of a waxy consistency, prone to changing irreversibly even under slight impact.

As it is also reflected by the stress map, the vegetation was highly homogeneous on 8 June 2021, with a significant chlorophyll content, as befits its stage of maturity at that time of year.



The second survey made on 27 June 2021 detected a major change in the plants' chlorophyll content: it was significantly lower as a result of the advanced stage of maturity.



This map also clearly shows the difference between the Hygien +99 treated part of the field and the rest.

Purpose and application of the HIGÉN +99 product:

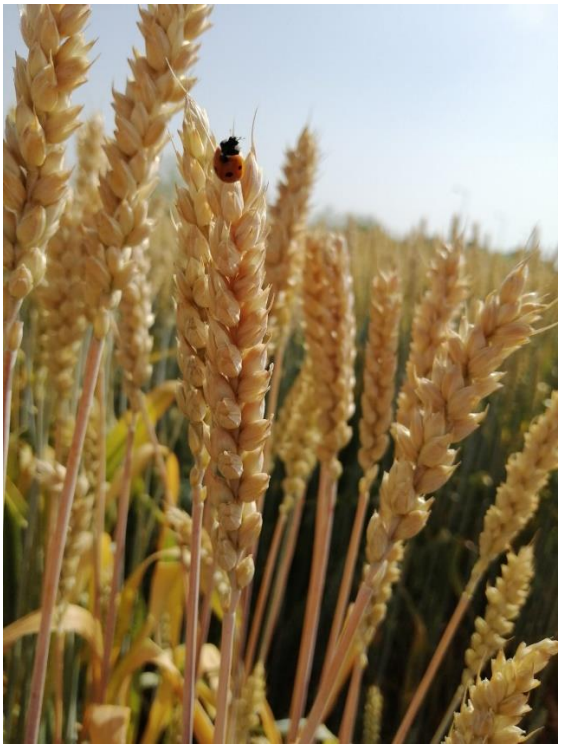
HIGÉN +99 – distributed by Ecowian Kft – is a combined contact fungicide, virucide and bactericide combination, whose decomposition leaves nothing but salt and water behind. The product was applied in the field of wheat in the way of a preventive measure against a fusarium infection. No prior result was available regarding the application of the product to field-grown cereals, therefore, we examined both the product's efficacy as a fungicide and its other impacts on the vegetation.

The product was delivered by drone-spraying of its

20% solution with ion-exchanged water as diluent and vehicle.

Condition of the vegetation during the assessments:

On 8 June 2021 and 27 June 2021



No sign of fusarium was found during the survey of the vegetation before the treatment and no such infection developed afterwards.

No undesirable harmful impact or pathological change was observed as a consequence of the treatment of the vegetation. The difference between the degrees of plant maturity in HIGÉN +99-treated part and the rest of the field are not supposed to be attributable to the product's impact affecting the maturing process but in view of the data gathered by the study this aspect is worthy of further exploration.

Other information:

The owner of the field plans to harvest the crop from the part of the field treated with HIGÉN +99 separately from the rest of the field.

Other information on the wheat produced on the field can be gathered after further analyses.

Budapest, 8 July 2021

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