

Využití dronů v zemědělské praxi

Precizní zemědělství



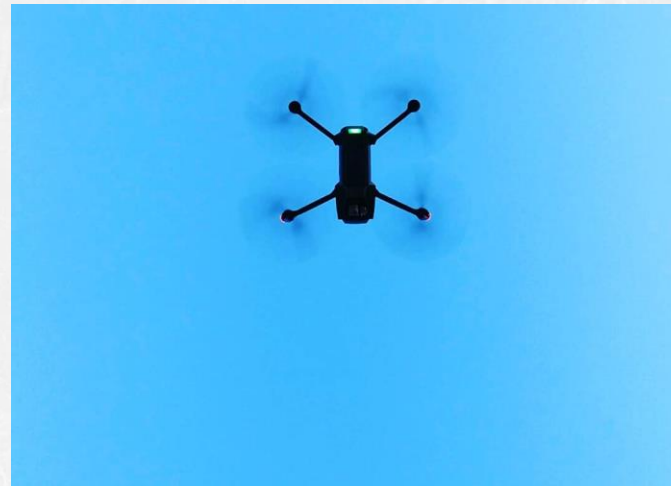
Měřte

Automatické měřicí senzory



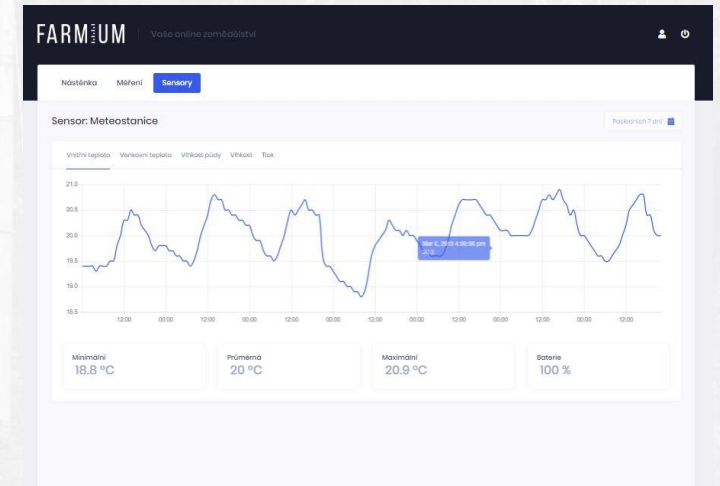
Monitorujte

Mapování pomocí dronů



Analyzujte

Aplikace pro zobrazení dat





Přínosy

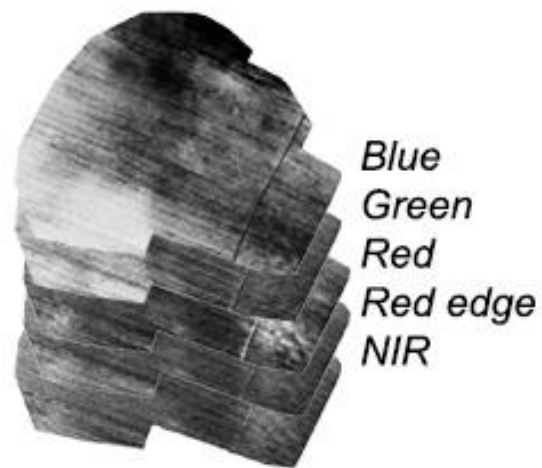


- Porovnávání zdravotního stavu rostlin
- Predikce doby sklizně
- Dokumentace škod na porostech
- Analýza půdy a ohnisek plevele
- Počítání rostlin

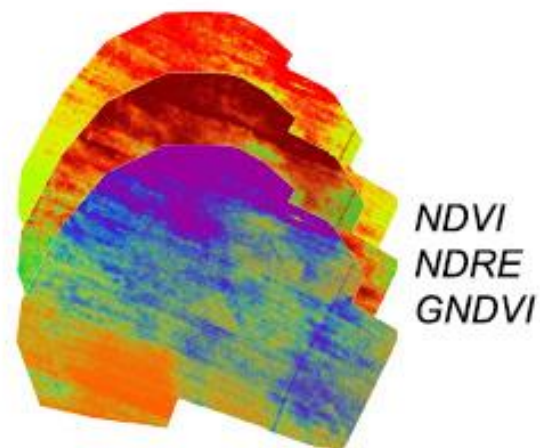




Drone imaging



Blue
Green
Red
Red edge
NIR



NDVI
NDRE
GNDVI



Corn field



Nutrition processing



Correlation



Harvest time prediction



Project 00012

Matrice 600 Pro

0 / 331 images

0 / 331 images

Use drone's or camera's SD card to transfer images to Pix4D Cloud or Desktop
Image download is not supported for the selected drone and/or camera

DUPLICATE

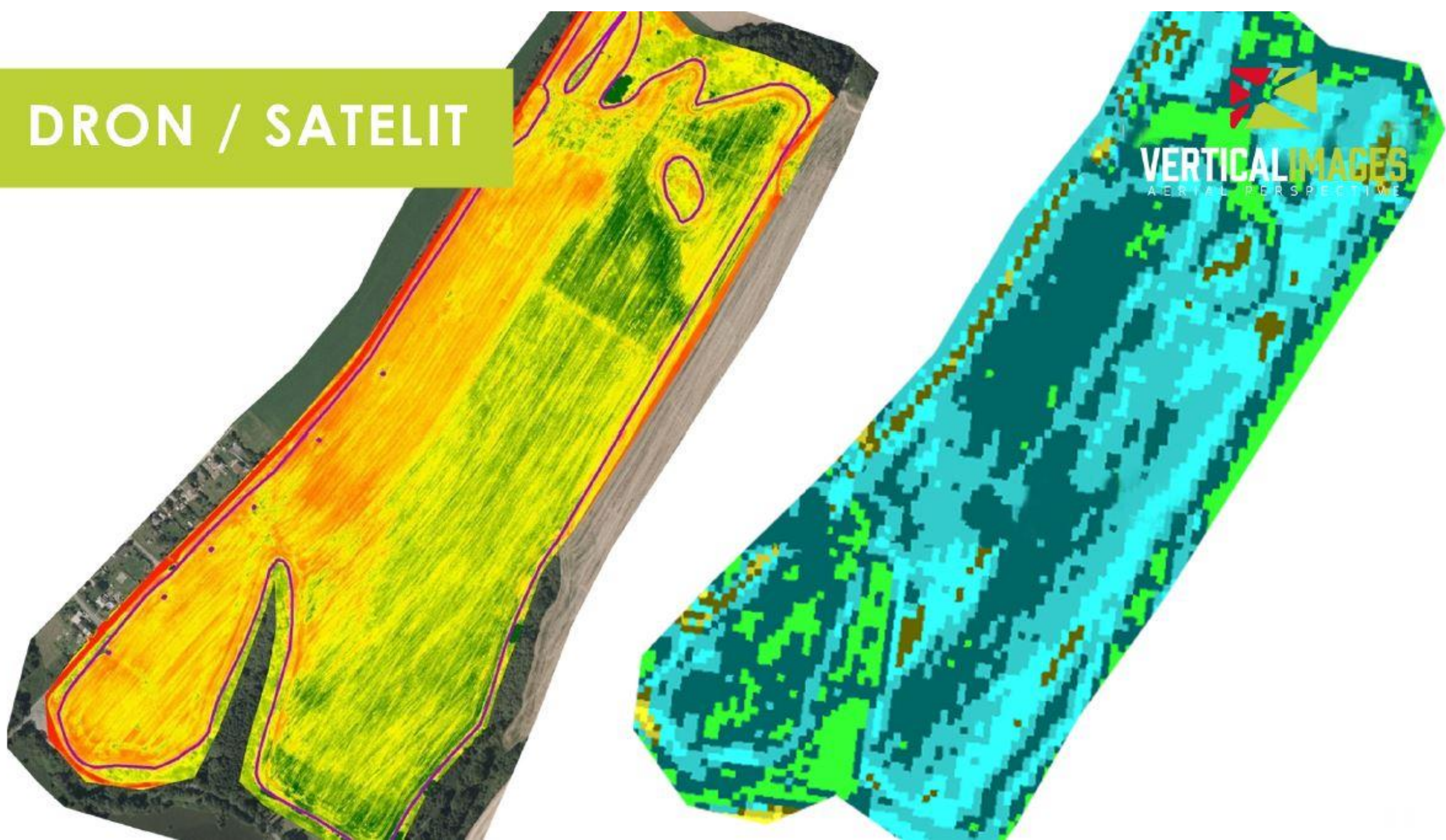
Project 00012

Drone Type	Date	Time	Type
Matrice 600 Pro	7. 9. 2020	13:22	Polygon
Flight Time	Location	Dimensions	Overlap
13min17s	49.148162°, 16.770571°	361m x 362m	50% - 50%
Camera Angle	Look Grid Center	Altitude	Path
90°	No	40m	4477m

Ok



DRON / SATELIT





Kamery



Heathy Vegetation Reflectance

50% NIR
8% Red



NDVI = 0.72

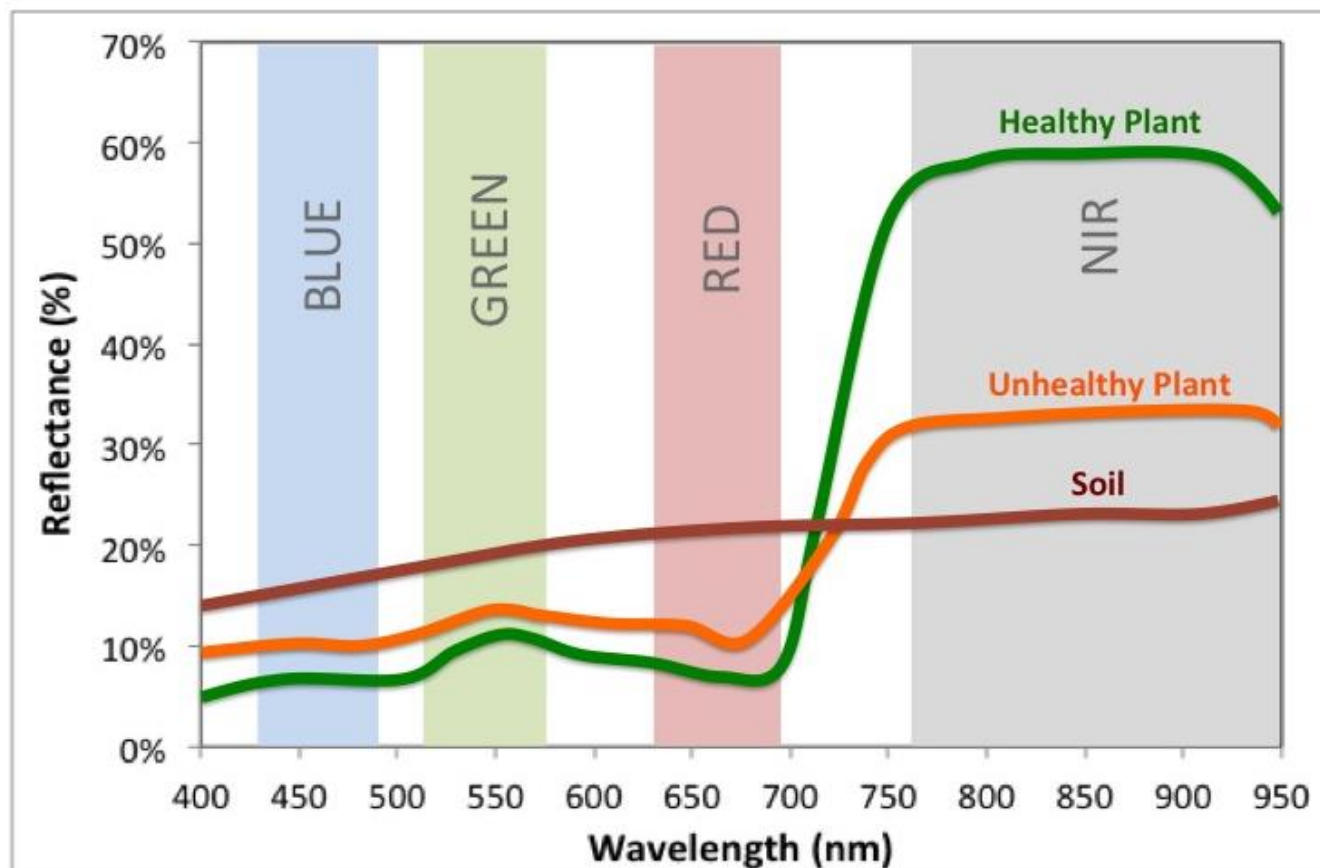
Stressed Vegetation Reflectance

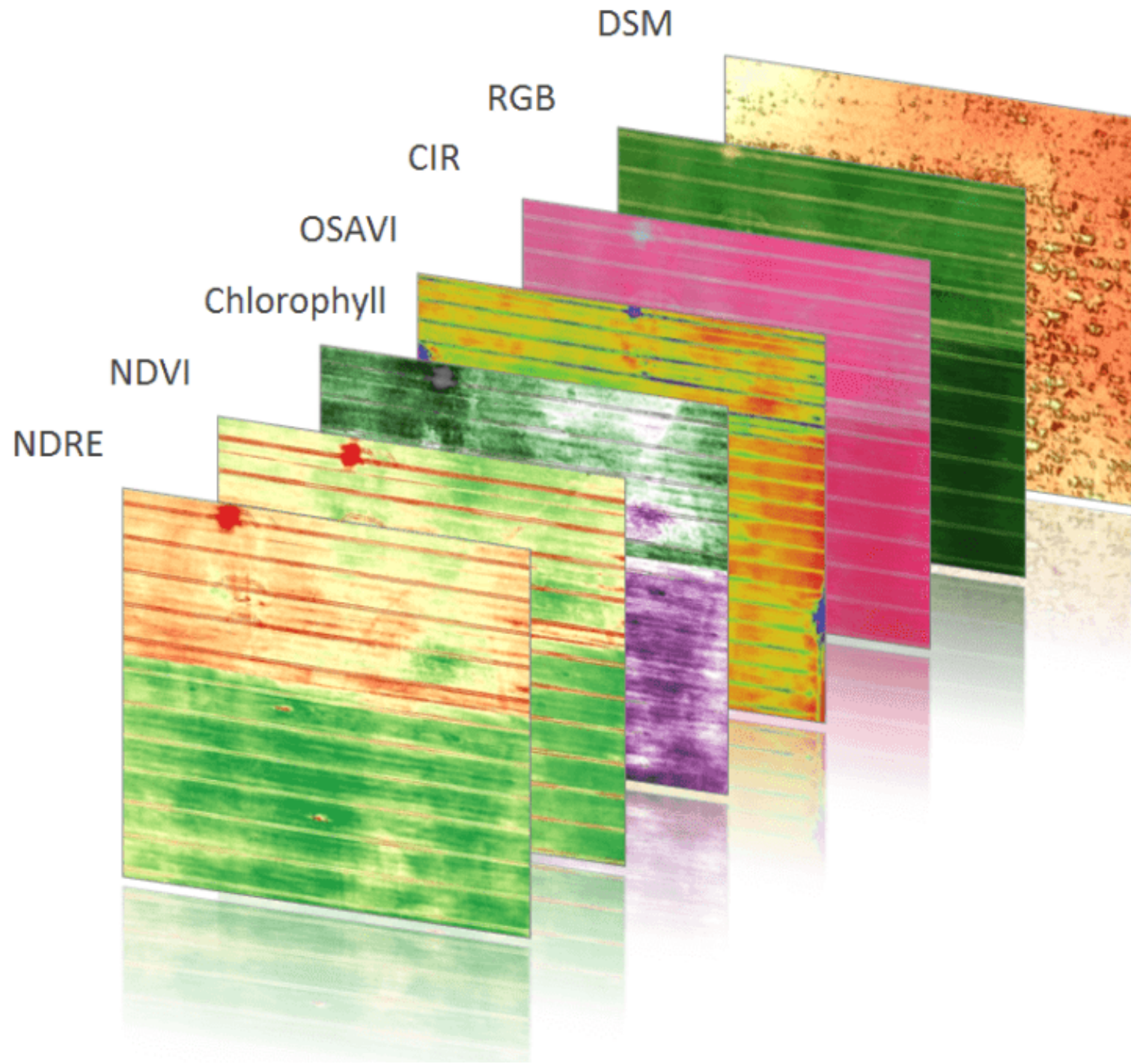
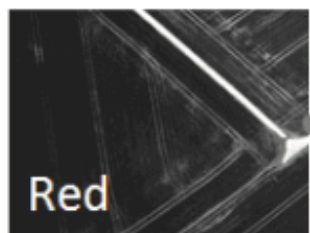
40% NIR
30% Red

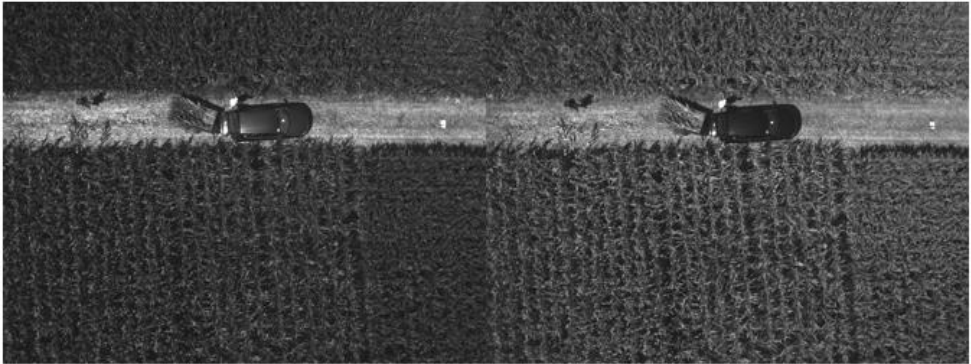
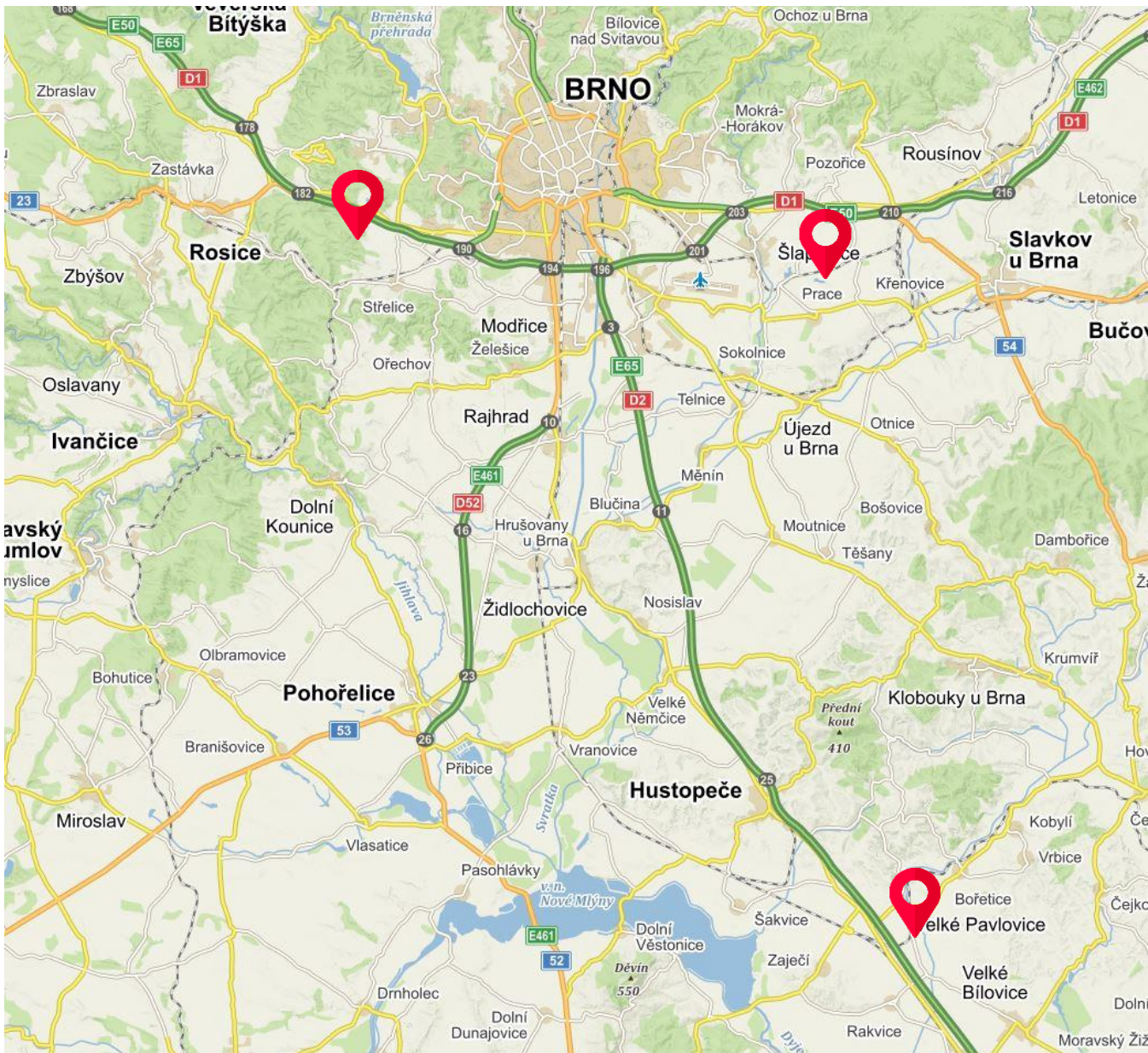


NDVI = 0.14

$$\text{NDVI} = \frac{\text{NIR} - \text{Red}}{\text{NIR} + \text{Red}}$$







1

2



3

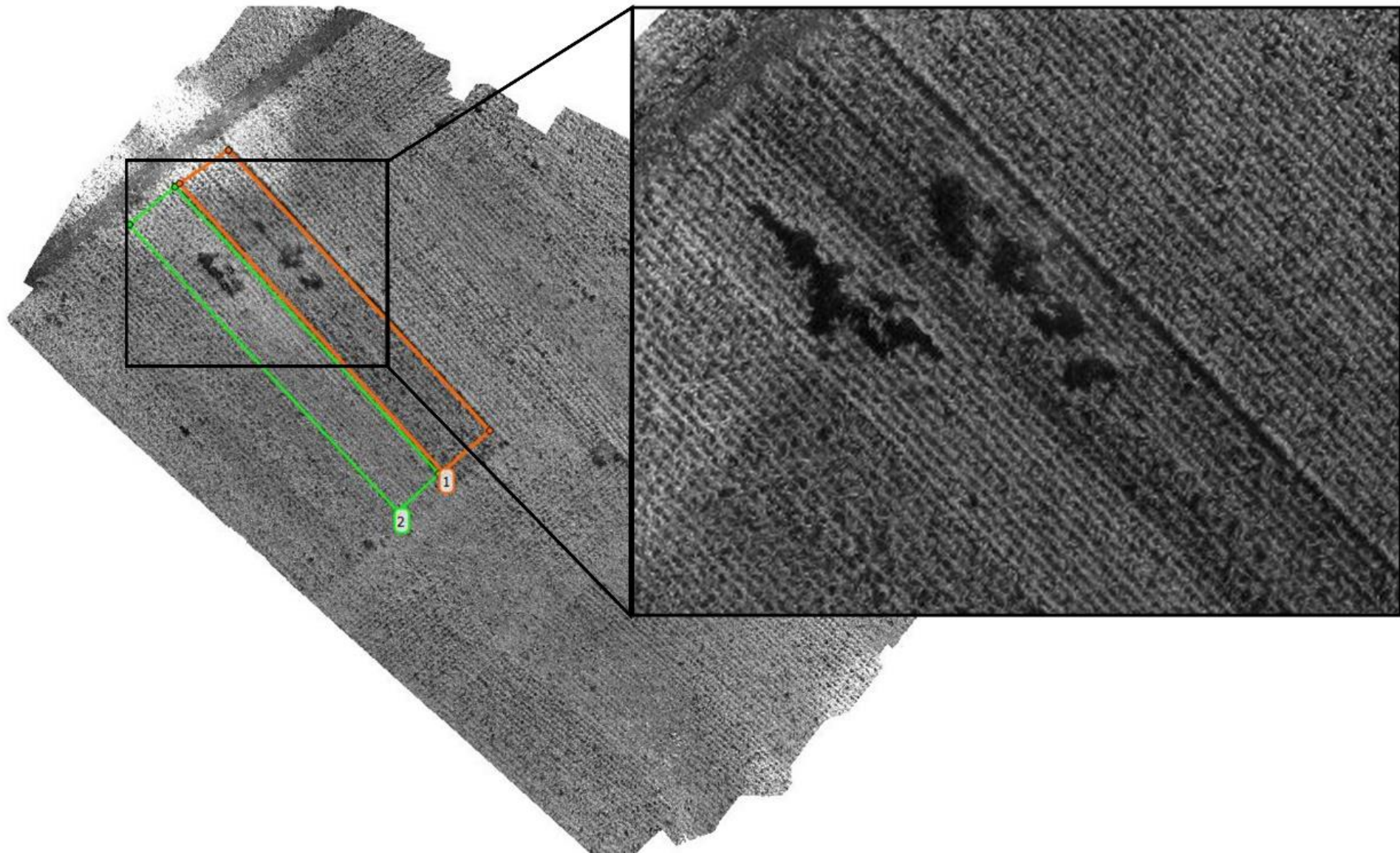


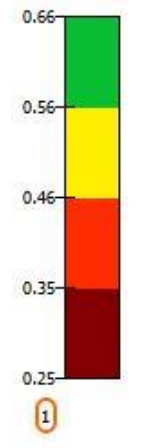
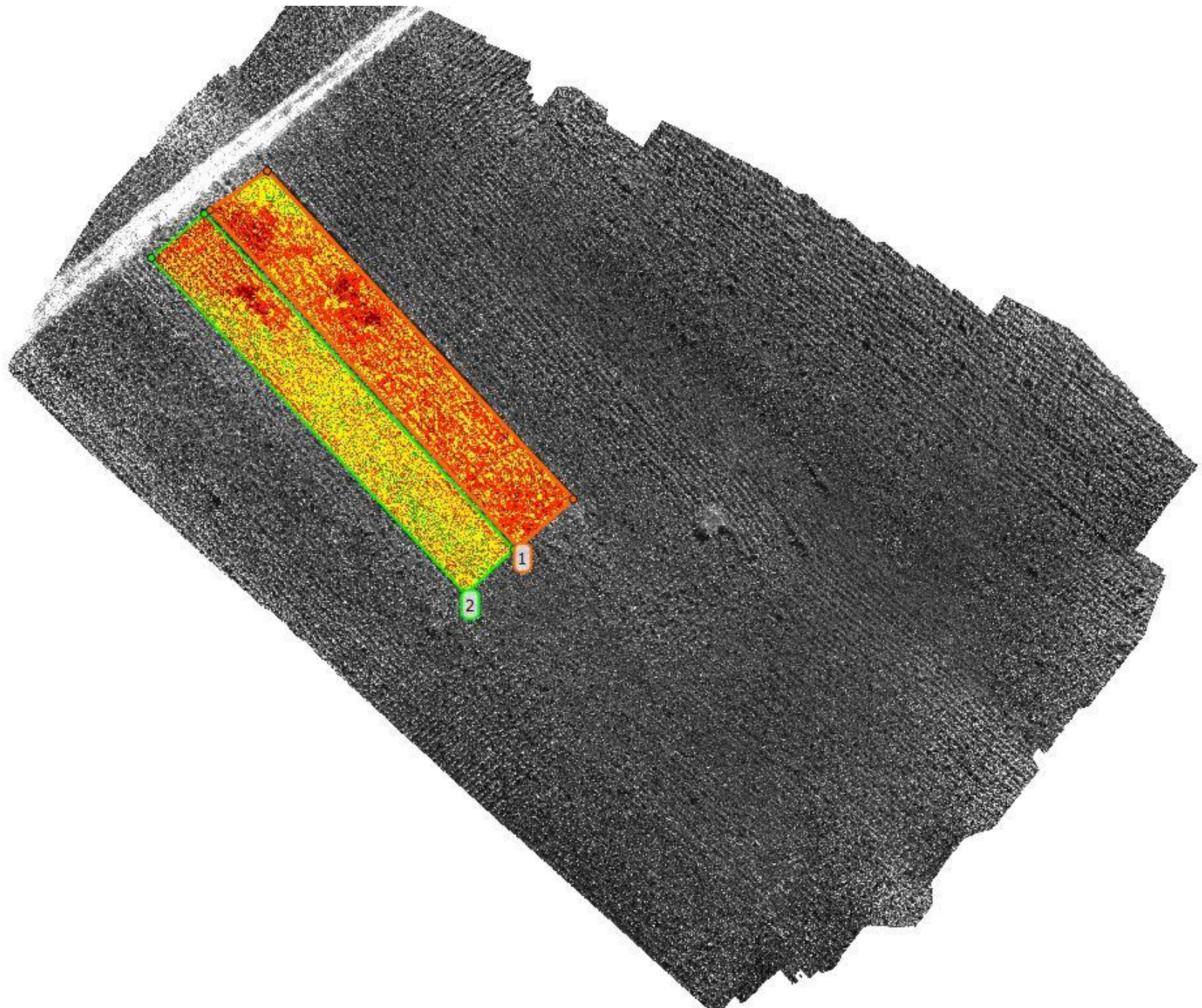
4

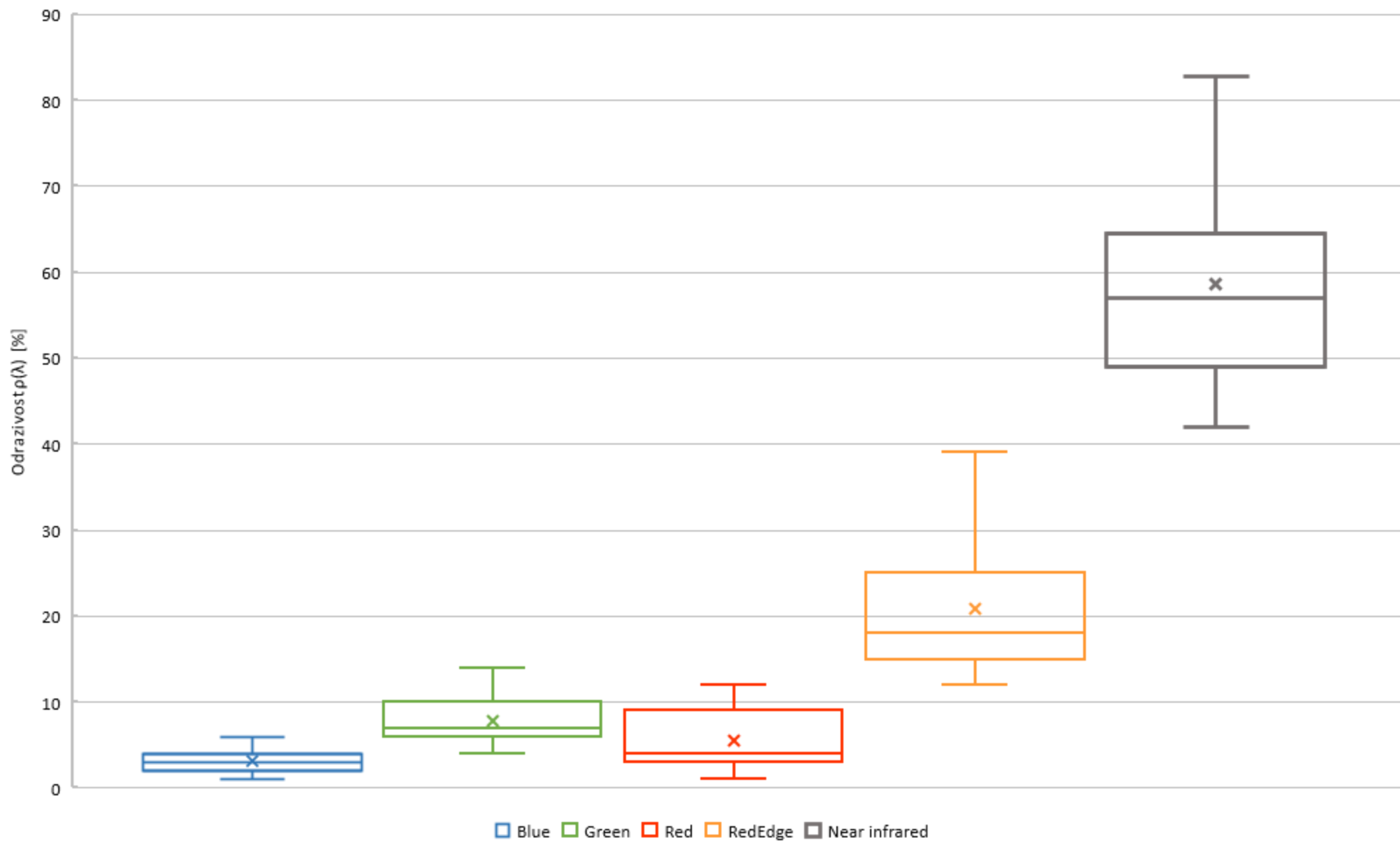


5

2021 DKC 3568	<u>Odběry</u>							
	1.	2.	3.	4.	5.	6.	7.	8.
<u>Nutriční analýza</u>								
DM [g/kg]	218,30	243,53	325,60	349,53	401,43	424,37	479,33	522,87
CP [g/kg DM]	105,0	93,00	72,10	72,80	70,0	68,0	65,0	65,0
CF [g/kg DM]	300,0	275,5	246,2	250,2	406,3	433,6	412,7	428,5
Starch [g/kg DM]	15,0	27,5	81,2	208,8	250,0	300,0	350,0	380,0
Ash [g/kg DM]	50,0	42,3	38,0	26,2	33,0	31,2	32,8	30,9
NDF [g/kg]	630,0	604,5	531,2	552,9	656,7	661,3	657,2	662,8
DNDF [%]	55,0	58,7	51,4	48,7	25,7	24,0	22,4	26,9
DOM [%]	70,0	72,3	74,3	67,4	41,5	41,4	41,2	44,1
<u>Výnosové charakteristiky</u>								
FM [kg/10 plants]	7,0	6,73	6,99	5,99	5,50	5,40	5,10	4,80
EW [kg/10 plants]	NA	NA	NA	NA	NA	NA	NA	NA
YFM [kg/ha]	56000	53840	55920	47920	44000	43200	40800	38400
YDM [kg/ha]	12225	13112	18208	16750	17663	18333	19557	20078

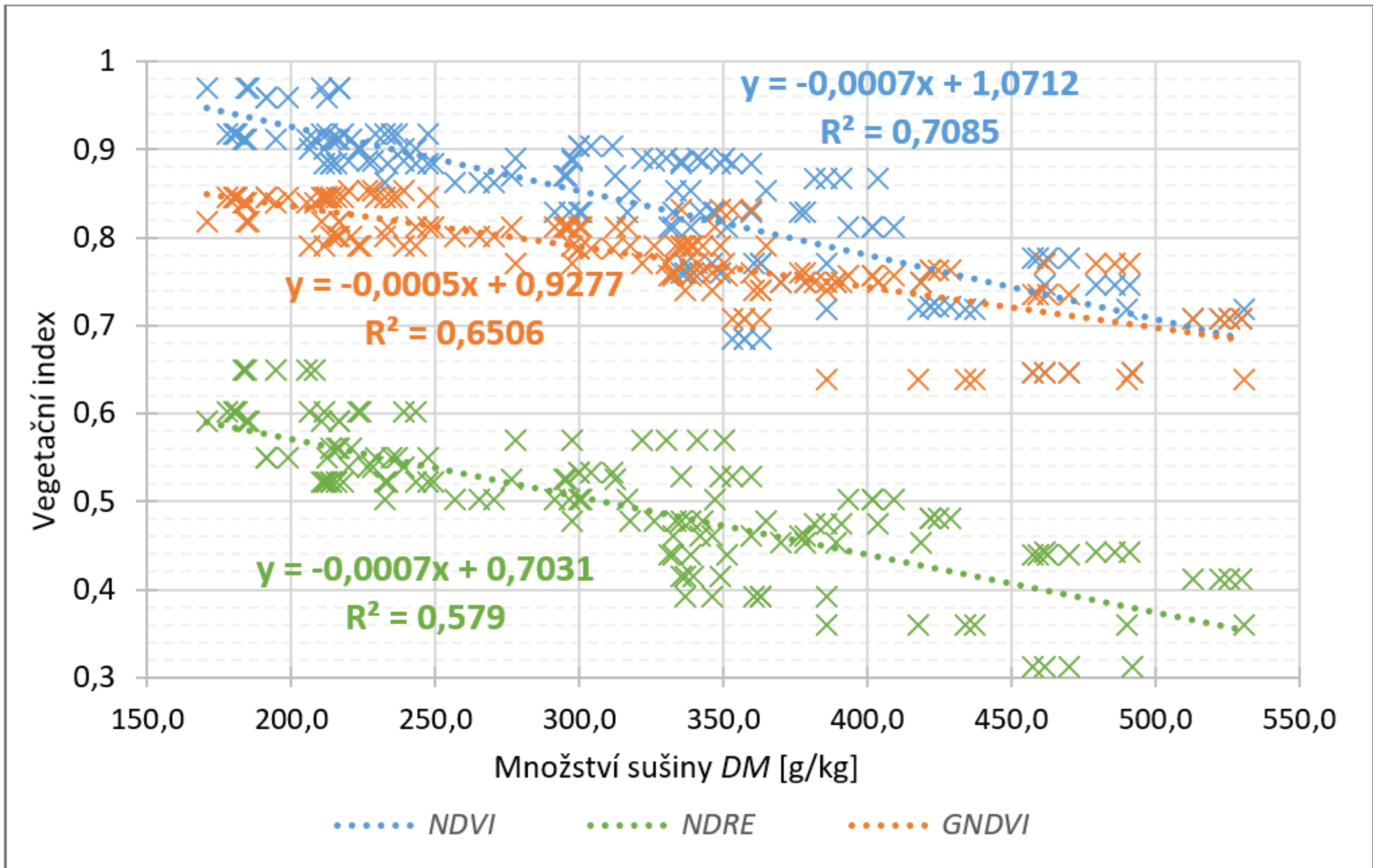


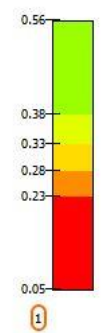
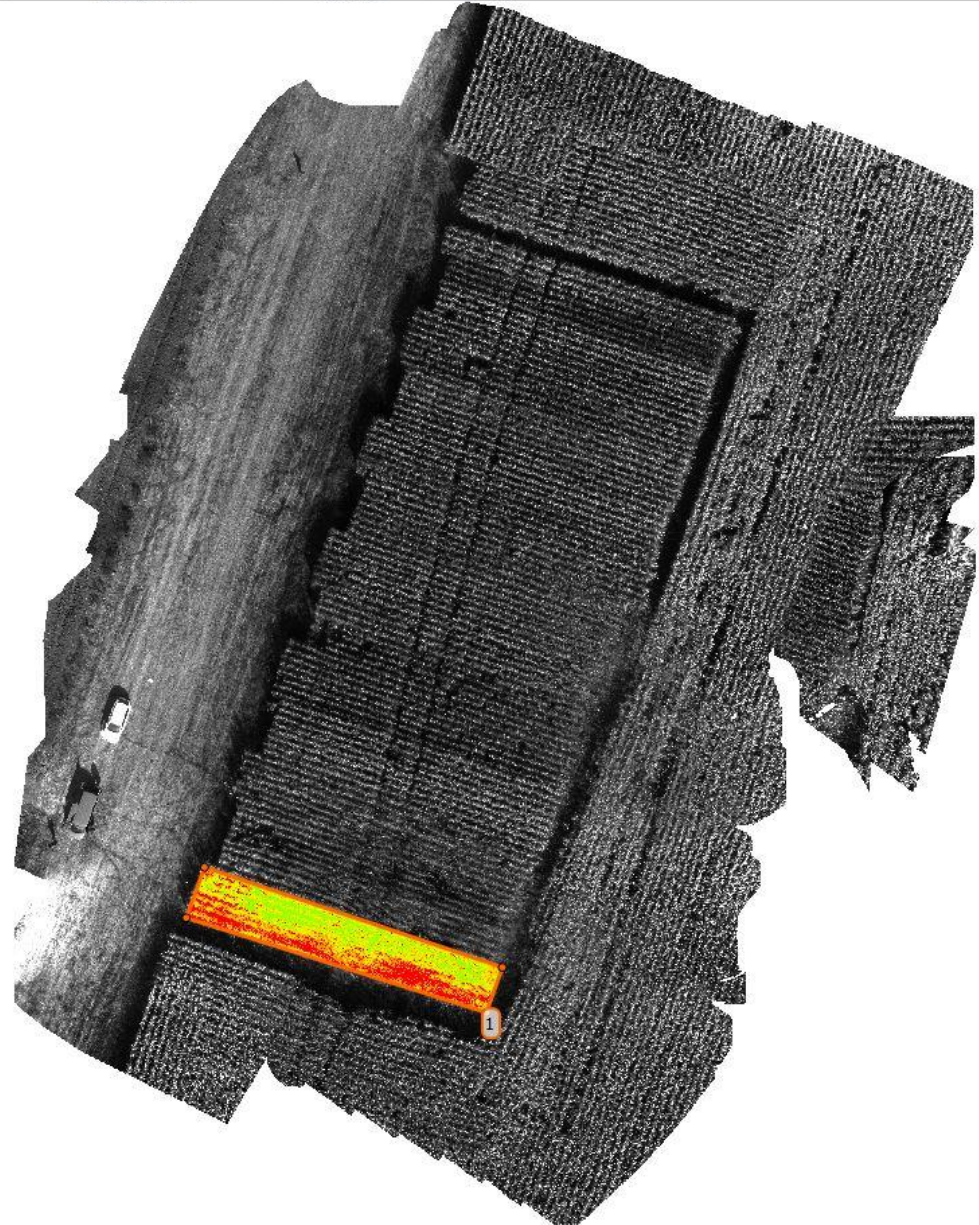




Corn	Vegetation index	Nutrition analysis								Yield characteristics			
		DM [g/kg]	CP [g/kg DM]	CF [g/kg DM]	Starch [g/kg DM]	Ash [g/kg DM]	NDF [%]	DNDF [%]	DOM [%]	FM [kg/ 10 plants]	EW [kg/ 10 plants]	YFM [kg]	YDM [kg]
2019 Silážní	NDVI	-0,773	0,191	0,760	-0,974	0,654	0,876	NA	NA	NA	NA	NA	NA
	NDRE	-0,903	0,444	0,888	-0,998	0,819	0,935	NA	NA	NA	NA	NA	NA
	GNDVI	-0,856	0,943	0,831	-0,665	0,885	0,668	NA	NA	NA	NA	NA	NA
2019 Zrnový	NDVI	-0,961	0,939	0,051	-0,855	-0,372	0,870	NA	NA	NA	NA	NA	NA
	NDRE	-0,980	0,864	0,055	-0,880	-0,433	0,967	NA	NA	NA	NA	NA	NA
	GNDVI	-0,983	0,840	-0,144	-0,949	-0,568	0,953	NA	NA	NA	NA	NA	NA
2020	NDVI	-0,920	0,922	0,798	-0,884	0,853	0,719	-0,563	-0,863	0,375	-0,712	0,375	-0,761
	NDRE	-0,924	0,854	0,777	-0,867	0,756	0,697	-0,381	-0,803	0,420	-0,841	0,420	-0,769
	GNDVI	-0,901	0,746	0,654	-0,751	0,639	0,579	-0,456	-0,651	0,530	-0,334	0,530	-0,645
2021 DKC 3568	NDVI	-0,911	0,733	-0,914	-0,914	0,579	-0,720	0,912	0,905	0,918	NA	0,918	-0,775
	NDRE	-0,855	0,672	-0,671	-0,753	0,372	-0,453	0,696	0,635	0,707	NA	0,707	-0,812
	GNDVI	-0,867	0,747	-0,787	-0,788	0,511	-0,558	0,795	0,772	0,792	NA	0,792	-0,804
2021 DKC 4279	NDVI	-0,917	0,673	-0,933	-0,906	0,743	-0,605	0,774	0,883	0,887		0,887	-0,748
	NDRE	-0,805	0,579	-0,843	-0,806	0,736	-0,523	0,721	0,768	0,814	NA	0,814	-0,632
	GNDVI	-0,950	0,661	-0,873	-0,916	0,769	-0,527	0,787	0,840	0,923	NA	0,923	-0,790

Value	0 až 0,2	0,2 až 0,4	0,4 až 0,6	0,6 až 0,8	0,8 až 1
Correlation	Very weak	Weak	Medium	Strong	Very strong





Index Calculator

1. Reflectance Map

Generate Help

Band	nm	Min	Avg	Max	Stdev	Var
blue	475	0.00	0.05	0.63	0.03	0.00
green	560	0.01	0.08	1.19	0.05	0.00
red	668	0.00	0.09	1.79	0.07	0.01
nir	840	0.05	0.34	3.05	0.14	0.02
red_edge	717	0.02	0.18	1.51	0.10	0.01

2. Regions

1 Draw Clear Regions... Help

3. Index Map

Name Formula

NDRE = (nir - red_edge) / (nir + red_edge)

Edit... Indices... Generate Help

Band	Min	Avg	Max	Stdev	Var
band1	0.04	0.31	0.58	0.09	0.01

4. Color Maps and Prescription

Number of Classes: 5 Equal Area Help

Min/Max: 0.05 - 0.56 Clamped

Color	Min	Max	Area [ha]	Area [%]
Green	0.38	0.56	0.00	19.97
Yellow-Green	0.33	0.38	0.00	20.01
Yellow	0.28	0.33	0.00	20.00
Orange	0.23	0.28	0.00	20.01
Red	0.05	0.23	0.00	20.00

RdYlGn Invert Prescription...

5. Export

Index Values and Rates as Polygon Shapefiles (SHP) with Grid Size: Export

Colored Index Map (GeoTIFF) and GeoJPG (JPG): Export

Upload Reflectance Map to MicaSense Atlas: Upload Help

Kukuřičný hybrid		ES Joker	ES Wellington	KTG Karlaxx	Absolutissimo	Rudolfinio
Nutriční analýza DM [g/kg]		459,11	470,83	383,53	423,17	398,67
<i>NDVI</i>	<i>DM</i> [g/kg]	458,86	464,53	404,74	429,58	409,41
	Δ_{DM} [g/kg]	0,26	6,31	21,21	6,41	10,74
	δ_{DM} [%]	0,06	1,36	5,24	1,49	2,62
<i>NDRE</i>	<i>DM</i> [g/kg]	457,69	443,85	402,02	429,29	387,14
	Δ_{DM} [g/kg]	1,42	26,98	18,49	6,12	11,52
	δ_{DM} [%]	0,31	6,08	4,60	1,43	2,98
<i>GNDVI</i>	<i>DM</i> [g/kg]	461,46	470,78	384,81	426,83	392,71
	Δ_{DM} [g/kg]	2,35	0,05	1,28	3,66	5,95
	δ_{DM} [%]	0,51	0,01	0,33	0,86	1,52

Děkuji za vaši pozornost