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How can drones replace time-consuming manual (and not accurate) registrations in field trials?





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- [Thomas Nitschke](#), Danish Technological Institute
- Focus on drones, sensor technology, robots and precision agriculture





Drones in Field Trials – A Nordic open network

- 1 – 2 online annual meetings
- It's all about the use of drones in field trials
- 51 members on the mail list
- 10 – 20 participants in the meetings
- Interested in being on the list? Contact tnit@dti.dk / nfh@dti.dk

The screenshot shows a video conference in progress. The main content is a presentation slide titled "Identifikation" (Identification) from the "selvi" software. The slide features a top banner with the Danish Technological Institute logo and an image of a tractor in a field. Below the banner, the slide is divided into two main sections: a software interface on the left and a physical field layout on the right. The software interface includes a "ZONAL STATISTICS" section with a table showing "07006" for "1 PLOTS" and "1 PARCEL" for "1 PLOTS", along with a "CALCULATE STATISTICS" button. The physical field layout shows a grid of plots with blue markers. On the right side of the video conference, two participants are visible in separate windows. At the bottom right, a control panel shows five circular icons with initials: JH (Jon H), MH (Mette H), CH (Christian H), TH (Tina H), and ES (Erik S).



Field Trials - Great potential for the use of drones



- Looking forward to seeing the next 4 posts which focus on drone possibilities:

How can drones contribute to plant breeding, and what advancements do they bring to the field?

Speaker: [Aakash Chawade](#), SLU

What can you register with different drone cameras?

Speakers: [Mats Söderström](#), SLU och [Igor Tihonov](#), Solvi

Field trials through image analysis of drone photo

Speakers: [Pernilla Wahlquist](#) and [Ulrika Dyrland Martinsson](#), Hushållningssällskapet

Reliable herbicide dose-response curves with logarithmic application and drone image analysis

Speaker: [Martin Gejl](#), AgroLab

- And to hear your ideas and experiences in the round table discussion later



Drone flights - on a grand scale.

- Education and training activities
- Ongoing follow-up on problems
- Guidelines and standards online

Each drone pilot following standards for marking, calibration, altitude, speed, and camera type.

- Approx. 20 drone pilots and +2000 drone flights in field trials

Omrids af aktuelt enkeltforsøg, samt 1. parcel i 1. gentagelse markeres første gang der flyves på arealet i solvi under ZONAL STATISTICS.

Disse omrids bruges i det efterfølgende parceludklip.

Er der flere forsøg på arealet laves omrids af hvert enkeltforsøg (og navngiv hver enkelt omrids med plannr.).

Er der indsat ekstra værn på arealet, som IKKE findes i PCMF, skal disse IKKE være med i omrids.

I NFTS markeres flyvningen som udført ved at aktivere de aktuelle måleparametre, indsætte dato for flyvningen og det observerede stadiet i forsøget. Alle dronemåleparametre godkendes.

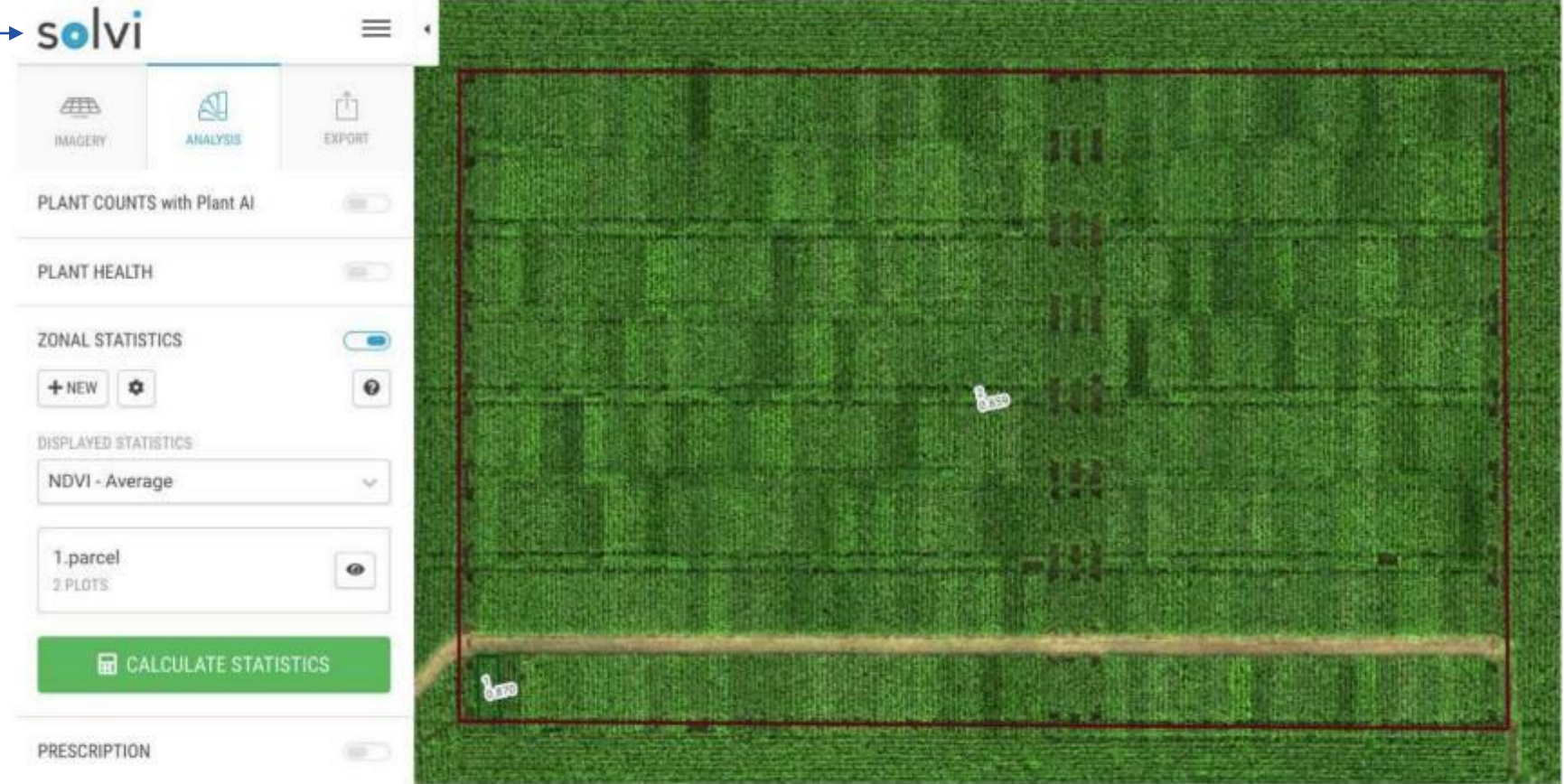
(stadietangivelsen er VIGTIG, så: **HUSK altid at skrive korrekt stadiet i afgrøden ved den aktuelle flyvning**)

Stadie	Parcel	Elevation	Udværelse	Løb	P-IDRE-REFLEKSMÅL Droner
1	2	1	1	34	0.173651136
5	3	1	2	A4	0.208201422
5	4	1	3	A1	0.18118024
1	5	1	4	A2	0.134758788
1	6	1	5	B2	0.401959794
1	7	1	6	A3	0.46829285
1	8	1	7	B3	0.411342916
1	9	1	8	B1	0.378358687
2	2	2	5	A2	0.38856785
2	3	2	10	A1	0.327775911
2	4	2	11	B1	0.30388981
2	5	2	12	B2	0.3513911
2	6	2	13	B4	0.306401514
2	7	2	14	A4	0.392289713
1	8	1	16	A5	0.36264882



Workflow

- Pilots upload pictures to
- Mark trial area and 1. plot

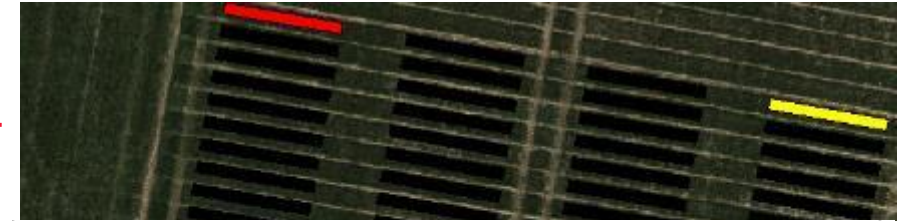


And the trial is now ready for
The plot cut analyze

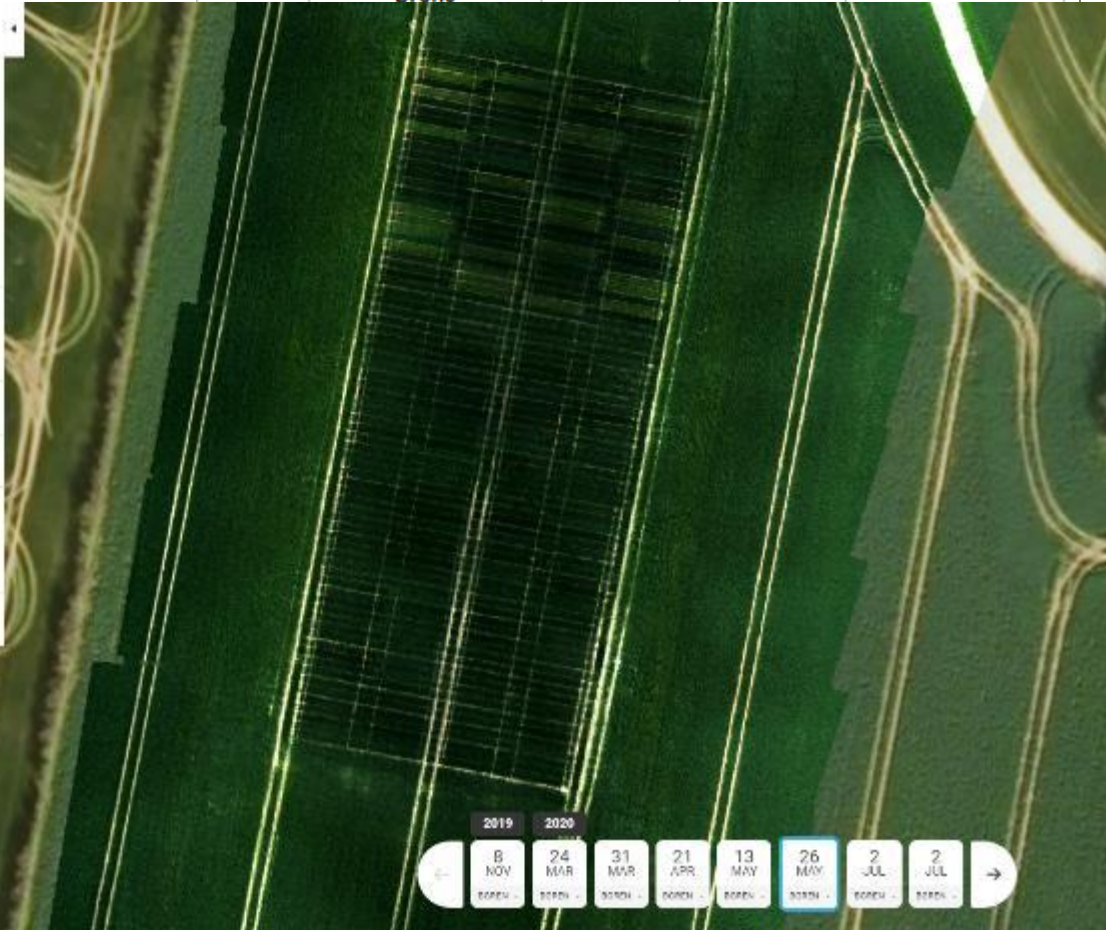


Workflow

- DTI data-mine in-house using R-script to annotate field layout and begin proprietary analyses
- Data is automatically exported to the Nordic Field Trial System
- Making a trial note with a link to the public drone picture in solvi



P08:			
13-05-2020 ST. 37			
NDRE-REFLEKTANS Drone	Nedre konf.	Øvre konf. int.	Signifikansgr. ujust





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- Biomass index and growth curves
- Crop coverage
- Plant height
- Plant counts
- Spike counts



Spike counts



Model:

- Pre-trained YOLOv8 object detection model run on 48 annotated images (approximately 6500 annotations)
- Result: Precision ~86%, recall ~84%

Precision is a measure of the model's accuracy. A precision of ~86% means that when the model predicts a positive class, it is correct ~86% of the time.

Recall is a measure of the model's completeness. A recall of ~84% means that the model is able to find ~84% of the actual positive cases in the dataset.





ROUNDTABLE DISCUSSIONS

- **Greater outcome of drones in the field trials**

We will begin by allowing the participants to **share their experiences** with drones and their **ideas for future use**. This will likely stimulate a fruitful discussion around **opportunities** and potential pitfalls

Questions?