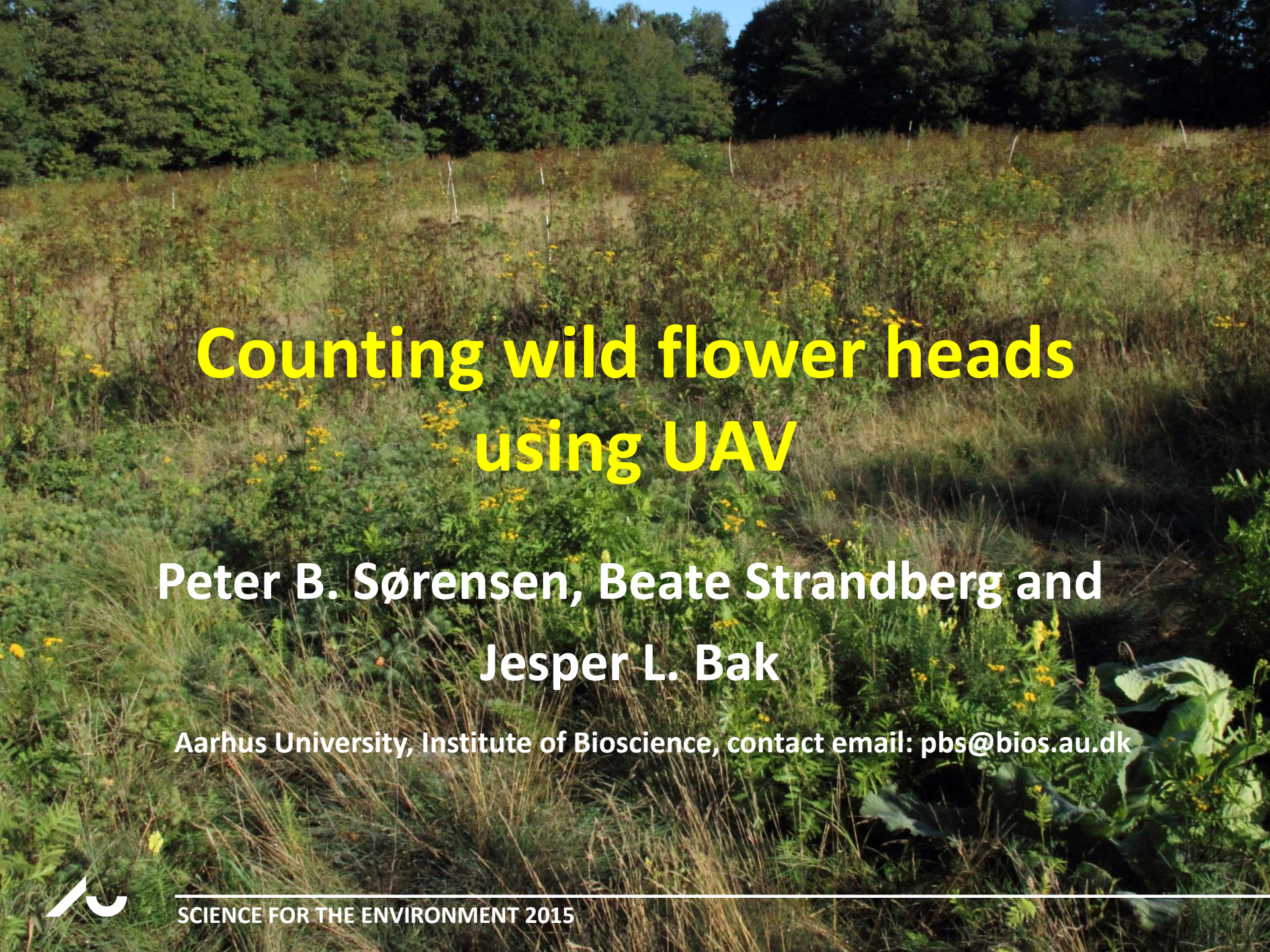

Counting wild flower heads using UAV

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Background

- Wild flowering is ***important*** at ecosystem level (insect fauna, crop production, landscape beauty)
- Wild flowering is a plant community ***characteristic*** (heater, dandelion…)
- Flowering ***sensitive*** for agricultural activity (agrochemicals and nutrients)
- Wild flowering is ***sensitive*** to climatic conditions
- Wild flowering is ***easy*** to detect by vision and thus attractive for automatic records (pollinators uses their eyes…)

Working hypothesis

- It is rather ***easy*** to detect flowers by vision, so a data collection and analyzing system will be highly effective to cover larger areas
- Some type flowers are more easy to detect than others, so the task is to identify good indicator flowers for fast identification techniques

The PENTA project (Danish EPA)

How do herbicides affect non-target terrestrial plants (NTTPs) at individual, population and ecosystem levels?

As a small part of this project:

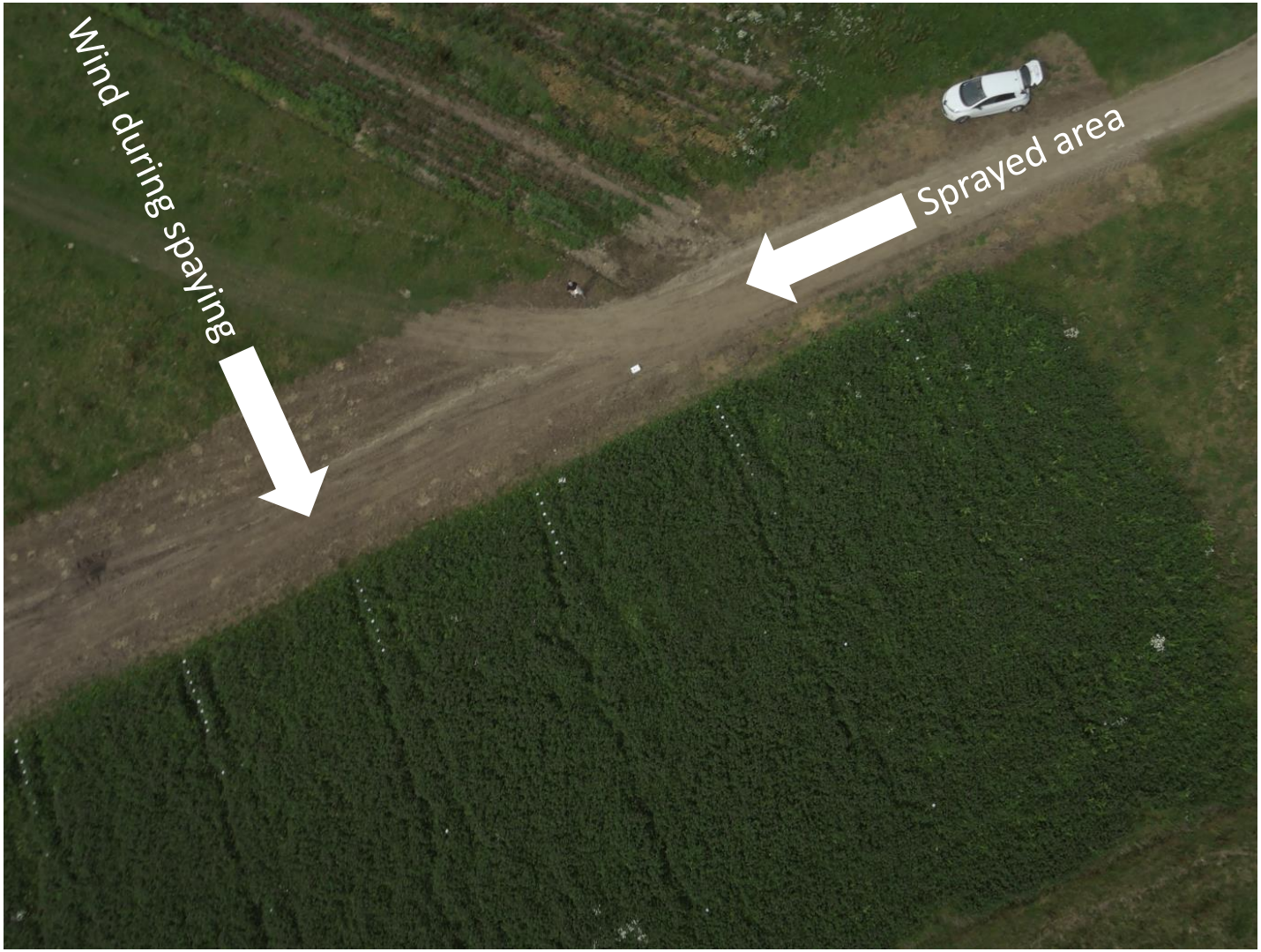
Flowering of herbaceous species in natural and semi-natural habitats are applicable as indicator of herbicide exposure

Simple, basic, ”primitive” drone

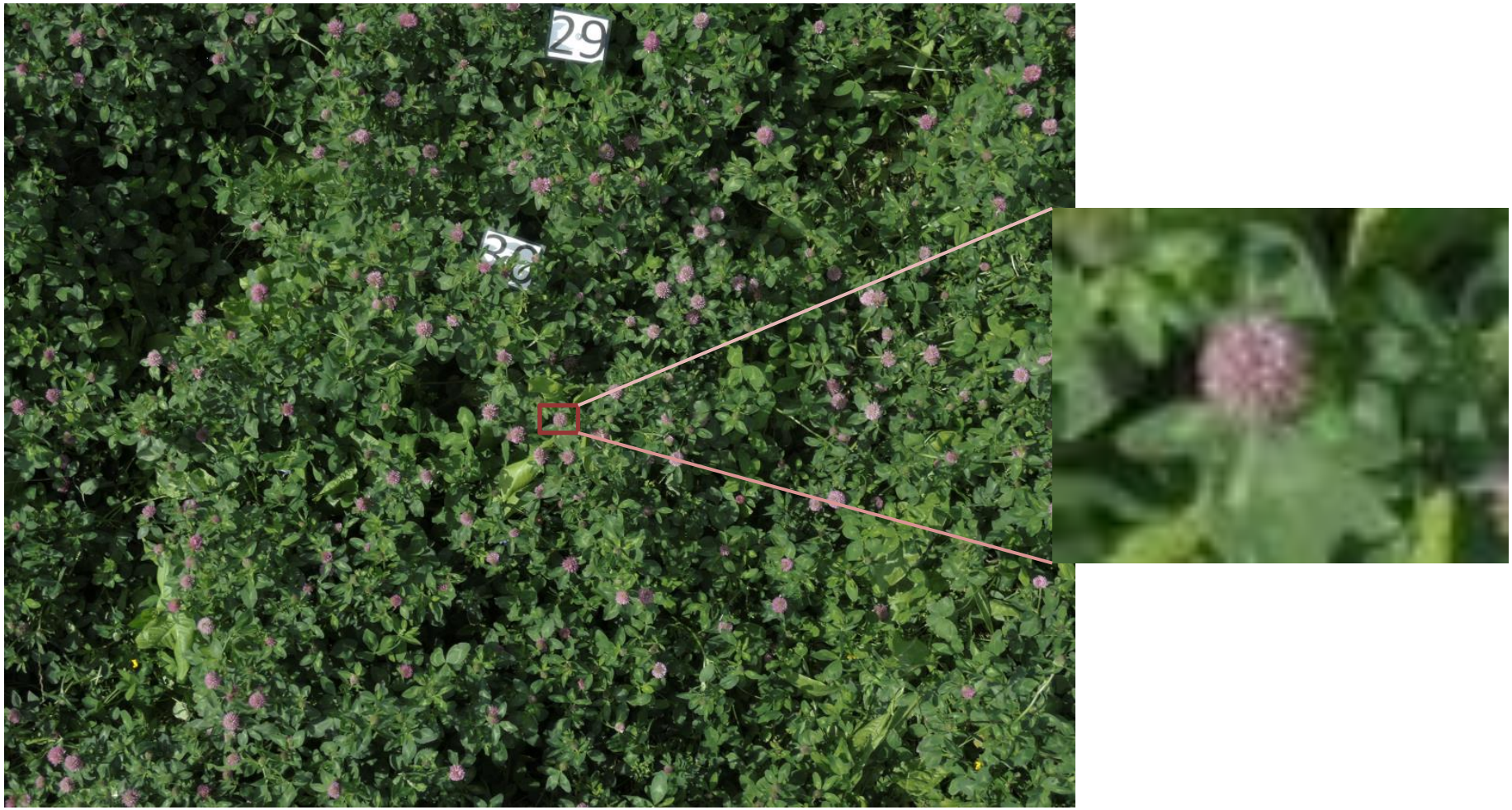
- Cheap manually controlled flight
- Piece of hiking mattress used to take vibrations for the camera
- Basic compact camera that has to be adjusted before take off

Version October 2015:

Testing area: Spray drift experiment

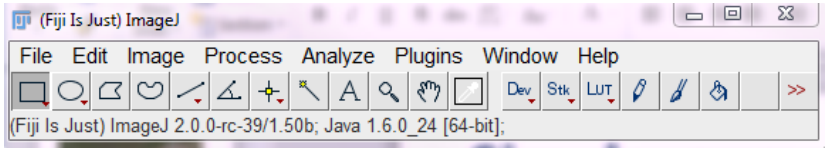


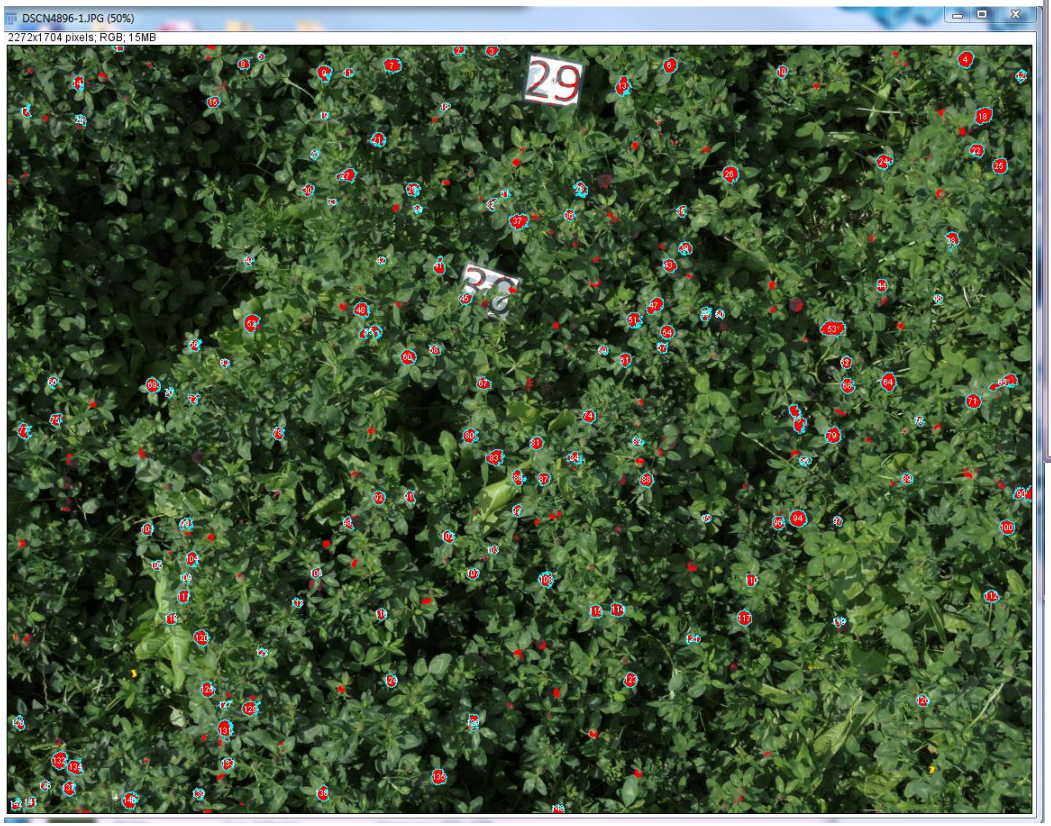
High resolution, small area



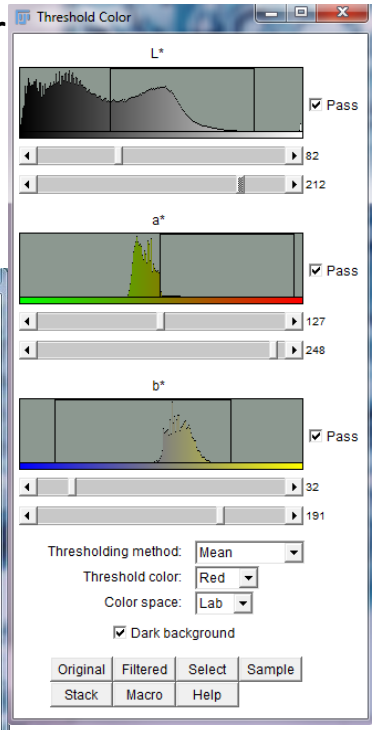
Simple, open source analysis tool

Preprosessing

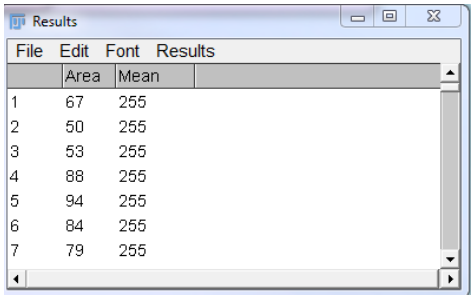


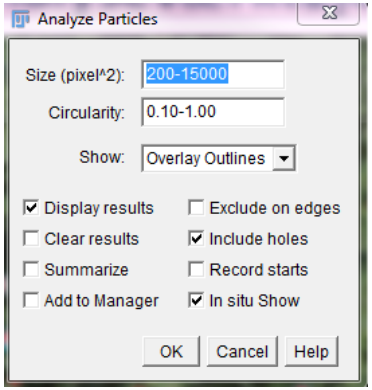


colour



Output stat





Form

High resolution

One miss (ligh too low)

Correctly not counted
(too small area)

Correctly not counted
(wrong shape)

Acurate area

Less acurate area
(but counted as one)

Low resolution, large area

Low resolution, simple technique

Less obvious, also for manual classification

Approx. right number

But some errors, e.g. merging

Different flowers difficult
But not impossible

Conclusion

- Easy to use open source tools available for image analysis
- Source available for automatization (in java) and thus many-image processing possible
- Examples shown only few pages of code

More sophisticated methods can be used

- K – means
- Template matching

Perspective

More specific ground truthing will be made during winter 2015/16