The Bigger Picture: Analyzing Aerial Imagery FAQ

Are there certain resolution targets for different functions or goals?

Yes. Satellite imagery is sufficient for general insights across entire fields. Manned aircraft and drone provide more precise imagery for identifying row-by-row issues as well as more directed scouting reports. Drones can provide the resolution necessary to identify insect and disease species without entering the field; however, they must be flown at low altitudes, close to the crop canopy.

What are some of the challenges with drone data?

The biggest issue with using drones for analysis is scaling to an entire operation. It takes a lot of time to fly a field with a drone—typically 45 minutes to an hour, and if fields are far apart then drive time has to be considered. Additionally, while there are a couple of solutions that enable in-field analysis, typically the data must be uploaded which requires sufficient bandwidth not always available in the field. Also, as the drone is flying the camera closer to the crop canopy the stitching process to generate a mosaic is more taxing and complex.

In our experience, expect to cover at most 1,000 acres per day with a drone.

Where will robotic field scouts fit into scouting with imagery?

Robotic field scouts can supplement aerial imagery to give even more insight into field performance. We anticipate aerial imagery and related analysis will initially help direct where robotic field scouts should go, and as the cost of robotic field scouts decreases, they'll be able to capture imagery useful for analysis in conjunction with aerial imagery.

What's your opinion on false NDVI maps created from a standard camera vs. a true NDVI camera?

For image analysis, the quality of camera makes a big difference as well as determining the specific spectral bandwidth measured. A standard camera is not designed to measure the narrow bandwidths necessary for good measurement. IntelinAir uses high end cameras to capture our industry-leading resolution imagery, and similar cameras (albeit expensive) are available for drones.

What are your thoughts about aerial observation equipment makes / models, i.e., quadcopters, planes, and cameras?

There are many good drone and camera systems. Before moving to manned aircraft, IntelinAir used multirotor drones. In our experience, they fly more reliably than fixed wing planes although they do require more frequent battery changes. We use a proprietary multirotor brand. For the camera, we use the Micasense Red Edge camera. There are many good drones—both fixed wing and multirotor—as well as a few good, high end cameras available. Please feel free contact us directly at customersuccess@intelinair.com for more information.

Are drone and camera equipment prices coming down?

Over the past several years prices have remained fairly static, while quality has increased dramatically. If you want a reliable, robust multirotor drone which can capture imagery suitable for analysis, expect to spend $8-10k. For visual crop scouting, you can get a decent drone with extra batteries, for $1-2k.

How soon and how late should images be collected?

We believe there is value in collecting imagery throughout the season. Bare soil imagery provides insight into planting conditions, tile lines/drainage, and weed pressure. Collecting imagery often through the early to mid-season helps identify emergence issues/replant opportunities, weed pressure, compaction, nutrient deficiencies and disease/insect pressure. In the late season it is not necessary to collect imagery as often, typically every 2-3 weeks to identify areas of late season disease and for harvest timing purposes.

Is corn easier to image and understand than soybeans?

Both have challenges in terms of interpreting imagery to take action; however, corn tends to have a more direct relationship to vigor as measured by NDVI or other vegetative indices than soybean, especially on the high end. In soybean, high vigor can be good, but can also lead to issues such as higher incidents of lodging and disease. The correlation to yield can be uneven with soybeans, whereas with corn you'll see a more direct relationship.

Another difference is that with soybean often such issues as SCN or SDS or other diseases will reveal themselves later in the year and can be missed with lower resolution imagery.

What imagery can be used to analyze acres of no-till?

Several image types are useful to gauge residue. RGB (naked eye imagery) is probably most useful for determining residue to soil ratios, and Color Infrared can help differentiate live plant materials from inactive residues.

Can imagery be used to model yield potential and what time in the season should those images be captured?

Imagery throughout the season can help indicate/estimate yield:

- Early season, first month post planting → Up to 30% of yield can be determined during this early period. The vegetation row health image provides a comprehensive view of areas with a weak stand where you can expect decreased yield potential.
- Late June - V10/12 → This is a prime time to see the impact of compaction and other issues on yield through the anomaly algorithm which highlights these areas.
- Pre/Post-pollination → Understanding the condition of your corn crop coming into and out of pollination as well as uniformity of pollination is also a great way to understand yield potential.
- Grain fill → Instead of pulling ear samples from random areas of the field you can sample based on anomaly zones and calculate a much more accurate yield estimate for the field.

Is it possible to calculate cover crop acres aerially?

Yes. Please contact us directly at customersuccess@intelinair so we can better understand the use case and provide a more specific answer.

What imagery can be used to analyze the amount of cover crops on a state-wide scale?

This is less about specific imagery and more about the time and scale of collection. To do this, the entire state would need to be flown early in the year before burn-down.

Can imagery be used to evaluate soil health subjectively?

Imagery can only tell part of the story when it comes to soil health, but there is still potential for insights. It can be used to identify areas of soil erosion and runoff, as well as leaching zones in the field. We can also get insights into soil organic matter from the air.

How useful are these images at identifying unknown tile systems and evaluating their effectiveness?

These images can be extremely effective if the timing is right. The imagery works by detecting non-uniform drainage patterns at the soil's surface. RGB, CIR, and Thermal imagery can be useful in identifying unknown tiles lines.

Which type of aerial imagery is most useful for soybean production? Are some types of aerial imagery more useful for crop health?

NDVI, CIR, RGB, and Thermal are all useful for assessing soybean health at various points in the season.

Can you do stand counts on soybeans?

Currently, our algorithms estimate stand and do not perform explicit counts; nevertheless, our results are highly accurate, proven with extensive groundtruthing. As image resolution increases in the future, we plan to provide an exact plant count.

Can you identify growth stages on corn and soybeans?

It is possible to estimate growth stage; however, identification is not exact.

What are your services and pricing schedule?

A: AgMRI is available in many states across the Midwest and Great Plains, primarily for corn and soybeans, but we are evaluating its use in other crop types. AgMRI is $5/acre for 13 flights (1 flight at plant; 9 flights between V2/3 thru pollination; 3 flights post-pollination).

AgMRI users will receive RGB, NIR (10cm/pixel), and Thermal imagery, paired with our analytics algorithms which include early emergence, weed detection, anomaly and change detection. Visit agmri.com for more details or to sign up, or email sales@intelinair.com for a demo.