Frequently Asked Questions
about Aerial Crop Performance Mapping

Q: The patterns of relative crop conditions in my field as seen in the image are interesting, but how can it make me more money?

A: The crop performance image helps growers to QUANTIFY the economic differences between the good, fair, and poorly performing zones of a field using a 3-step process, thus allowing them to more accurately calculate net dollar returns from crop management changes.

Correlate – divide up the field into zones of similar crop conditions using the image patterns as a guide. Compare the crop patterns in the image versus what you see, or measure, on the ground in each zone to determine what is causing those patterns.
Calibrate – quantify the estimated yield differences between the zones of similar crop conditions.
Calculate – compare the yield x price x acres = $$ for each zone. How much is Zone A better than Zone B? Why? What are the cost and economic returns for a management change to fix it?

Scenario1: From the image, you find a poorly performing crop zone relative to the rest of the field. The image tells you where this poor zone is, and that 15 acres are affected. You walk out to the poor area and discover that the stalks are weak and have a yellow cast, but there is adequate water. You estimate the yield reduction in that zone is 50 bushels/acre less than surrounding areas. You pull a soil sample while you are there. You discover that the pH is very low. Just to make sure, you pull another sample from a good area and find out that the pH is fine. This coming fall, you put lime on the poorly performing area to boost yields by an estimated 30%/year in that area. Result: You found the location, number of acres, cause, and economic impact to determine your net economic returns to fix the problem for the coming year and subsequent years. 15 acres x 50 bu/ac x $3/bu = $2250, less cost of lime at $435 = $1815 net return.

Scenario2: You have irrigated corn. From the image you see that there is a 20 foot wide concentric ring of poorly performing crop centered on the middle of the pivot at the 5th span. On the image, you measure the distance from the center of the pivot to the ring of poor crop, and use width of the ring to calculate the affected acreage to be 5.4 acres. When you go to the field to check it out, you see that the corn in the ring is not performing as well as its neighbors and you estimate a yield difference of 30 bu/acre. So this problem so far has cost $486 (5.4 acres x 30 bu/ac x $3 per bushel). While the pivot nozzle covering that area is sending out water, you look more closely and see that the nozzle is partially plugged or stuck. You unplug the nozzle for $50, and the poorly performing ring of crop now has enough water for the rest of the season, thus preventing further yield losses of 50 bushels/acre or more. Net return = $760 (($5.4 acres x 50 bu/ac x $3 per bushel) - $50 cost to fix)

Q: I already have a combine yield maps that show the variation in my fields, so why would I need a growing season aerial crop performance map?

A: A combine yield map is a wonderful way to see the END RESULTS, which are the variations in yield patterns in your field. However, it does not tell you WHY. After harvest, the crop stubble will not tell you if the yield patterns were caused by lack of nitrogen, bugs, disease, weeds, spray drift, water issues, pollination issues, soil compaction, tillage problems or other things that affected the crop.

A crop health image generated from an aerial photo allows you to identify the location and acreage of the crop health problem areas BEFORE harvest while you can still observe the crop conditions on the ground in those areas and be able to identify and economically quantify the CAUSES. While you may not be able to make changes to this year's crops, you can make informed economic decisions that will affect next years crop now since you now know WHY.

Scenario: For instance, small pockets of soybean rust that you found via the aerial photo/ground observations will influence your decision on seed choice, and guide you on where to scout first the following year. A combine yield map will not have told you WHY.

Working Together: Harvested yield maps and Crop Health Images from aerial photos are complementary. Each offers valuable, but different perspectives on crop variability, so it is very useful to compare the crop patterns between them. For instance, why did the crop health image show a zone as looking good, when the combine yield map shows it as a weak area? This would imply a late season issue that depressed yields in that particular area worth further investigation.

Q: Even if I see on the aerial crop performance photo the crop patterns where disease or insects have gotten into my crops, by then it is already too late to fix it. So what is the value of getting the aerial?

A: While you may or may not be able to benefit in the current growing season, many crop health patterns persist into following years. These might include soybean cyst nematodes, garden symphylums, certain soil-borne diseases, chronic nitrogen losses due to poor drainage, soybean rust, uneven application of crop inputs from faulty farm implements, et al. The image can then guide you on where to scout for these problems early in the season on next years crops to catch a potential budding problem early. Awareness pays off.

Q: I use a crop scouting firm to check my crops. So, so why do I need an aerial crop performance photo?

A: The crop performance photo markedly improves the results from crop scouting because the good, fair, poor zones of similar crop conditions act as a guide for WHERE to look and take field observations ahead of time, rather than using a random loop through the field that can easily miss key areas. It also improves crop scouting efficiency.

- Think of the image as providing the crop scout with thousands of 1 square meter crop health samples that the crop scout can calibrate by zone from his/her ground observations. For every 40 acres, the image provides 161,800 crop health samples. Compare that with the dozen or so measured/recorded observations made on a typical crop scouting foray.

- With crops waist high or higher, the crop scout can meaningfully observe crop conditions perhaps within 10 to 15 feet along their path through the field. Thus, a typical loop through the field means that the crop scout makes observations on about 3.5 to 5.5 acres out of 160 acres or about 3% of the field. That's 97% of the field that the crop scout is NOT seeing!

- The aerial crop performance photo covers 100% of the field in fine detail.

There are weaknesses to both traditional crop scouting methods and the use of an aerial crop performance photo by itself:

- The aerial crop performance zone map does not tell you the cause of a problem, but it does provide the location and number of acres for each zone of similar crop conditions, and the map provides an accurate visual lay-of-the-land understanding of crop health patterns in detail.

- Crop scouts tell you what the causes of a crop problem are, but without an aerial crop performance map they are unable to accurately quantify the economic impact other than a very crude guesstimate of the acres involved based on the inherent limitations of walking the field.

The Combo works! The benefits of using both crop scouting and an aerial crop performance photo of the field together are enormous because they overcome the weaknesses of each. This marriage works because the zones of similar crop conditions as seen on the crop performance photo act as a guide for the crop scout to use his/her 3% ground coverage intelligently by efficiently target scouting efforts within the revealed zones of weak crop performance. They enable the simple *economic analysis of cost/returns* to fix the crop problems found.

Scenario: It begins with the crop consultant using the aerial crop performance photo as a guide to map the zones of similar crop conditions. The aerial map clearly shows a patch of very heavy vegetation in the northeast corner of the field, that the crop consultant delineates as a zone. When he gets there, he sees that this area *correlates* with the crop patterns on the map and is overrun with giant ragweed that is robust, dense, and actively growing but still small. He *calibrates* the estimated yield loss as 60% if not corrected. He then *calculates* the economic impact and cost/returns to fix the problem. 200 bu/acre x 60% x $3/bu x 10.5 acres in the zone = $3,780, minus the cost to fix at $300 = net return of $3,480 which is the result of the marriage of effective crop scouting and aerial crop performance mapping. The crop consultant shows the grower the aerial crop performance photo along with his/her results so that the grower can visually see the spatial extent of the problem from a birds-eye perspective.

Did you know an aerial crop performance photo can be used to

- **Create an alfalfa yield map as a guide for variable nutrient replacement?**
- **Map the patterns of residual nitrogen from sugar beet tops for variable application of nitrogen the following year? Saves lots of money.**
- **Map the "halo-effect" impact on crops from poorly drained areas to aid in drainage tile layouts?**

