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Aerial photos provide a tool for assessing midseason crop health

Flooded fields and hail have left many farmers wondering what kind of yield losses they can expect this fall. Should they have side-dressed additional nitrogen on their low-lying corn? Replanted the worst spots? What value would surface drainage or tile have for future crops? If you are asking these kinds of questions, now may be a good time to check the health of your crops with remote sensing. Mid-season aerial photography can show the location and extent of production problems.

Remote sensing of crop health works because plant color reflects stresses. With all of the yellow crops we've seen, it is no surprise that nutrient deficiencies and crop vigor show up in the visible region of the light spectrum — the wavelengths we see and that are captured in regular color film (400 to 700 nm). Color film is therefore a good way to document crop damage from standing water. Near infrared wavelengths (700 to 900 nm) do a good job showing the amount of biomass in the crop. Either type of film can be used in a consumer grade camera and shot from the window of a single engine airplane.

Here are some things to remember when taking the images or ordering them from a remote sensing service:

- When the images are to be overlaid with map data, take them from as close to vertical as possible. That will simplify the process of georeferencing the digitized images.
- Images taken at an angle help reveal topography and may give you a better perspective on how the

(Continued on page 155)
Field updates

Paul Hay, Extension educator in Gage County: So far grey leaf spot constitutes only a few lesions on lower leaves. The temperature and high humidities in southeast Nebraska this week could contribute to increases, but I hope not.

Del Roy Hemsath Extension educator in Frontier County: Irrigated crops look great. Range­land is drying up, pasture will become short very soon. Western bean cutworm eggs have been found on corn. Grasshoppers are a potential problem on field margins. Blister beetles abound.

Ray Weed, Extension educator in Kimball and Banner counties: Wheat harvest is underway and proceeding well. Initial reports indicate very low moisture (8% to 9 %), test weights of about 60 lbs/bu, and above average protein content. Yield estimates are above average in Banner County with 40 to 60 bushels an acre on silt loam soils.

While the dry weather is great for wheat harvest, dryland corn is stressed and needs precipitation. Sunflowers that are well-established (nearly waist high) are doing great in the heat because they can take advantage of the sunlight and deeper soil moisture with their deeper tap root system.

The Nebraska Agricultural Statistics Service reported on crop conditions, as of Monday: Warm, humid conditions last week coupled with rainfall in many areas of the state provided excellent row crop growing conditions but slowed wheat harvest.

The warm, humid temperatures also boosted grass growth of native pastures. Moisture received slowed irrigation activities and helped dryland crops find some relief from stressful, dry conditions, particularly in the South Central and Southwest Districts.

Winter wheat acreage considered ripe or already harvested is at 71%, compared with 51% last year and 56% average. Harvest progress, at 36% was slowed by showers but remained ahead of last year's 23% and 29% average.

Corn condition rated 4% poor, 19% fair, 61% good, and 16% excellent. Dryland corn rated 78% in good or excellent condition and 82% of the irrigated corn rated in those categories. Silking made excellent progress with 24% of the crop having reached that stage, well ahead of 2% last year and 10% average.

Soybean condition rated 2% very poor, 4% poor, 15% fair, 63% good, and 16% excellent. Blooming was underway on 25% of the acreage, compared to 16% last year and 17% average. Chemical and mechanical weed control activities remained active.

Sorghum condition rated 2% poor, 23% fair, 68% good, and 7% excellent.

Dry bean condition rated 4% poor, 26% fair, 61% good and 9% excellent.

Nebraska Agricultural Statistics Service, Lincoln
Aerial photography (Continued from page 153)

variability in the crop is distributed across the field.

- Film gives high-resolution images. Details found within individual rows show up and can be important. For example, in cases where individual nozzles on an applicator caused problems. Commercial scanners can digitize a picture of a 160-acre field into pixels representing about one quarter of a square foot.

- Clouds and haze cause problems. Even if a cloud isn't blocking your view of the crop, shadows cast by clouds can show up on the crop and influence the color of the light reflected by the canopy.

- Try to take the images at midday (10 am to 2 pm). At other times, leaves are more likely to shade each other or cast bright reflections, which interfere with measuring canopy color.

- Plant stresses show up best during periods of rapid growth and high nutrient demand. For corn, one to four weeks after silking is recommended as a good time to diagnose yield-reducing nitrogen stress. The three weeks before silking is also a good time.

The initial interpretation of a remotely sensed image follows some basic steps. When you receive the image, look for patterns in the colors. Two general types often show up, regular geometric patterns and irregular patches. If the image contains regular patterns, such as rectangular blocks or parallel lines, double check the management history of the field. Crop color normally changes where varieties, planting dates, and fertilizer rates change. On top of these planned effects, farmers have used aerial photos to identify management problems such as cultivator blight (see photo) and operator error in fertilizer application. One farmer realized his anhydrous ammonia applicator needed adjustment when he saw yellowing of every corn row fertilized by the outside knives.

Irregular color patches are likely caused by naturally occurring stresses. To diagnose those stresses, circle the patches on the image and pair up the problem areas with healthy areas that have received the same management.

Visit each pair of areas in the field and scout for stage of development, pest/weed levels, soil compaction, etc. Nutrient analyses of plant samples from those areas can help diagnose problems in plant nutrition.

A Geographical Information System (GIS) can help you better use the aerial photos to assess field health. GIS software can be used to trace around the problem area on the digital image. Once the boundaries are drawn, the GIS can calculate the area of that land. The boundaries also can be compared with data in other maps. A soil test map can be placed over the crop image, in the GIS, to see if the area of concern is correlated with a region of low nutrient availability or unfavorable pH. Yield maps from previous years can also be overlaid on the image, and the GIS can pull out the yields in the area of concern.

Look to see if yields are reduced in the area and check how consistent yields are from year to year. If yield losses occur in wet years but not dry, flood damage is a likely cause. If yield losses occur every year independent of weather, you will likely need additional scouting data to diagnose the cause of the problem. When this year’s yield map is available, you can overlay the map on the image and have the GIS calculate the actual yield loss in the problem area. That number combined with the yield history can then be used in an economic evaluation of the options available for solving the problem.

Jim Schepers, Leader, USDA/ARS Soil and Water Conservation Research Unit
Bob Caldwell, Extension Cropping Systems Specialist
Early spider mite infestations sighted

While checking corn fields for insect pests in western Nebraska, banks grass mite (BGM) colonies were found on a number of plants at field edges. Spider mites damage corn plants by removing fluids from the leaves. Their populations usually begin on the under surface of the lower leaves and move up the plant as their number increases. These pests usually move to the edge of corn fields from adjacent grassy areas or wheat fields. In most years, there are sufficient natural enemies to adequately control banks grass mites. In years of low moisture and high temperature, an increase in banks grass mite populations may overwhelm their natural enemies. Dry conditions also are conducive to grasshopper outbreaks. Producers that spray grasshoppers may aggravate infestations of banks grass mites because insecticides used for grasshoppers usually kill the natural enemies of the spider mite, but not the mite. This combination of factors can provide for a severe outbreak of banks grass mites.

Corn farmers should check the edges of their corn fields for spider mites. They are usually found on the underside of lower leaves. Their feeding activity turns the leaves yellow where a colony is active.

When scouting for spider mites, determine:
1) if two spotted mites (TSM) are also present,
2) the extent of the mite infestation,
3) the extent of mite damage and
4) if mite predators are present.

Two spotted mites are more difficult to control than banks grass mites, making species identification important. Banks grass mites are green throughout their bodies while two spotted mites have two distinct green spots on their upper back. A 10X hand lens should be used to make the identifications.

If many predators are present and rain is forecast, producers should wait and re-evaluate fields later. This allows time for the natural enemy populations to catch up with the mite infestation. If hot, dry weather is anticipated and farmers find 15% of the leaves have active mite colonies and 8% of the total leaf surface area is damaged by spider mites, an insecticide application should be considered.

Dimethoate and Capture have provided excellent control of banks grass mites. Dimethoate has little effect on two spotted mites.

For more information on spider mite management, see Spider Mite Management on Corn and Soybeans, NebGuide G93-1167, or the Department of Entomology’s home page on the World Wide Web (http://ianrwww.unl.edu/ianr/entmol/entdept.htm). It offers treatment guidelines and figures on mite and predator identification.

Ron Seymour
Extension Assistant
Integrated Pest Management
West Central REC, North Platte
Gary Hein, Extension Entomologist
Panhandle REC, Scottsbluff
Rootworm control not always warranted

Scout beetles now to assess need for control

Western corn rootworm beetles began emerging in late June and early July in south central Nebraska. Beetles emerging before silk emergence may feed on corn leaves. They feed by scraping the surface tissue, leaving a white parchment-like appearance. Once silks emerge this is the favored food. There are no thresholds for silk-clipping damage based on beetle numbers, because damage levels are not correlated well with beetle densities. Usually an average of at least 10 beetles per silk are required to seriously affect pollination. Severe silk feeding at emergence may feed on com leaves.

During late July and August these beetles will be laying eggs in corn fields. These eggs overwinter in the soil, hatch into rootworms in the spring, and feed on corn roots if continuous corn is grown. However, not all continuous corn fields have economic infestations of corn rootworms. Weekly scouting of adult rootworm beetles in July and August will provide you with information to decide whether a rootworm insecticide is needed next year. People using adult beetle control programs should base the decision to treat and spray timing on information from field scouting.

Begin scouting for corn rootworm beetles soon after beetle emergence begins and continue scouting weekly until threshold levels are exceeded or beetle activity stops. Examine 50 plants per field, taking samples from each quarter of the field. Sampled plants should be several paces apart, so that examining one plant doesn’t drive beetles off of the next plant to be sampled. The most reliable method is to examine the whole plant for beetles. Beetles may hide behind leaf sheaths or in the silks, so care is required to observe all beetles present. An alternative method is to check for beetles only in the ear zone (the area including the upper surface of the leaf below the primary ear and the under surface of the leaf above the primary ear).

In continuous corn if beetle counts exceed 0.75 beetle per plant, damaging populations of corn rootworms are possible in that field next year. In first year corn, there is a higher proportion of female beetles, so the threshold is lowered to 0.45 beetle per plant. These thresholds are based on a 24,000 plant population per acre. The number of beetles per plant to equal a threshold level should be adjusted for different plant populations (see NebGuide G86-774, Western Corn Rootworm Soil Insecticide Treatment Decisions Based on Beetle Numbers). People scouting using the ear zone method should divide the above thresholds in half, since on average only 50% of the beetles on a plant are counted using this method.

Yellow sticky traps also may be used for visual scouting. Research conducted in Iowa identified an unbaited Phercon AM trap as the best trap among several tested. Attach traps to the corn plant at ear height and leave in the field for a week. Use 12 traps per field, spread out over the whole field. If beetle counts exceed an average of six beetles per trap per day, this is equal to the treatment threshold. If beetle counts are below this level, continue sampling until the threshold is exceeded or beetle activity stops. Some advantages of using traps rather than visual examination are:

1) traps catch beetles over several days and average out variation due to time of day or weather; and
2) counts are not influenced by the experience or skill of the sampler.

Traps are available from the manufacturer, Trece (408-758-0204), or from Great Lakes IPM (517-268-5693) or Gemplers (800-382-8473) and cost about $1 per each.

Rotating the field out of corn or using an insecticide at planting or cultivation would help prevent economic damage. Fields remaining below the threshold level do not need to be treated with a rootworm insecticide next year.

Individuals using adult beetle control programs should begin treatments when the beetle threshold is exceeded and 10% of the female beetles are gravid (abdomen visibly distended with eggs). This is an important point since the first beetles to emerge are mostly male, and females require at least 10-14 days of feeding before they are able to lay eggs. Treatments applied too early may be ineffective if large numbers of females emerge after the residual effectiveness of the treat-

(Continued on page 158)
Dates predicted for second generation corn borer egg laying

Because of the low level of first generation European corn borer, we have only one location on which to base predictions of when second generation egg laying will occur.

Rootworm beetles

(Continued from page 157)

...ment has dissipated. Continue to monitor fields weekly after treatment for rootworm beetles. If beetle numbers exceed 0.5 beetles per plant, retreatment is warranted. Later maturing fields are particularly susceptible to corn rootworms moving into them from nearby earlier maturing fields.

A complete discussion of adult corn rootworm management can be found in Adult Corn Rootworm Management (Cooperative Extension publication MP63) by NU Entomologist Lance Meinke.

Be aware that reduced adult rootworm control with foliar insecticides due to insecticide resistance has been documented in the Holdrege and York areas (see Adult Western Corn Rootworm Insecticide Resistances in Nebraska, NebFact 98-367). If you experience poor control with repeated applications of foliar insecticides, and high numbers of beetles are still present, it may be better to consider rotating that field out of corn next year rather than continuing to treat for beetles.

Rates and restrictions of registered insecticides for adult corn rootworm control can be found on the label or at the UNL Entomology Home Page http://www.ianr.unl.edu/ianr/entomol/flducible/flducible.htm

Bob Wright
Extension Entomologist
South Central REC, Clay Center

Hamilton County Extension Educa-

tor Andy Christiansen sent me

information on the age distribution

of first generation corn borers he

collected in Hamilton County. This

information was entered into a

computer phenology model de veloped at Kansas State University.

The following are predicted dates of egg laying for second generation corn borers, assuming 30-year average weather data. Past Nebraska research has shown that these predictions are usually accurate within two to three days. There is some additional degree of error possible in this prediction since it is based on less than 50 larvae.

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It is recommended that scouting for second generation eggs should be targeted for the July 29 - Aug. 3 period in south central Nebraska. In northeast and west central Nebraska, moth flight and egg laying will be several days later. Light trap data from Concord, Aurora, Clay Center, Kearney and North Platte are available at http://www.ianr.unl.edu/ianr/entomol/flducible/flducible.htm

Next week’s Crop Watch will have an article on scouting and economic thresholds for second generation European corn borer. (Also see Second Generation European Corn Borer Scouting and Treatment Decisions, NebFact 98-365).

Bob Wright
Extension Entomologist
South Central REC, Clay Center

Special seeding rate not needed for Roundup soybeans

Dennis Kahl, Extension educator in Seward County: Can you tell me what the recommended seeding rate is for Roundup Ready soybeans as compared to regular soybeans? An insurance adjuster working with hail and flood damaged fields here has indicated that research at the universities of Nebraska, Iowa and Illinois says that 125,000 population is all that is recommended for Roundup Ready soybeans. A couple of the companies that this adjuster is involved with insist that 180,000 seeds per acre be planted.

Lenis Nelson, Extension crop variety and seed production specialist: There is nothing magic about the Roundup gene that would change the planting density from the same variety without the gene. At the same time we say that a final stand of 80,000 plants is adequate for a good yield. I suppose the opportunity for better weed control would give some reason to get by with a lower planting rate. However, the higher rate probably forces seed set to be a little higher on the plant for ease of harvest.

Roger Elmore, Extension Crops Specialist at the South Central REC, Clay Center: I agree with Lenis. There is no reason to think that Roundup Ready soybeans will respond differently to low stands. Some like to plant thicker than 150,000 live seed per acre, but no evidence from here supports it.

There is one concern I have though about low stands in Roundup Ready soybeans. The system relies on complete canopy closure to control late season weeds. With below-normal stands, canopy closure is slower and weed competition by soybean canopies is less. The

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Western bean cutworm moth flight begins

The first western bean cutworm (WBC) moth of the season was caught July 8 in a light trap at North Platte. With the emergence of this pest of corn and dry beans, crop consultants and farmers should start scouting corn fields for the white egg masses usually laid on the upper side of the upper leaves. Moth infestations in dry beans should be monitored with pheromone traps.

The white eggs, laid in masses of five to 200, are about 1/32 inch in diameter and have a sculptured, dome shape. It usually takes five to seven days for eggs to hatch. As they develop, they turn tan and prior to hatch they turn purple. When the larvae hatch, they move to feed on the developing tassel. The western bean cutworm larvae then migrate down the plant when the green silk becomes available. They feed on the silks, move behind the husk and begin to feed on the developing ear. Infestations are severe when more than one larva feeds in an ear.

Twenty-five plants in several locations of a corn field should be checked for western bean cutworm eggs. Randomly select sample sites but cover all areas of a field. If very few or a high number of plants are infested, as few as five check locations may be sufficient to establish an infestation level. If 5% to 10% of the plants have eggs, as many as 10 locations may need to be checked. If 8% of the corn plants checked have a western bean cutworm egg mass or small larvae, consider an insecticide application. Liquid insecticides applied by airplane or injected through a center pivot irrigation system typically provide adequate control.

Timing of an insecticide application is important. The larvae are most susceptible to control when they are active on the plants. Once the larvae move behind ear husks, control is more difficult. Treatment should be after a field is 95% tasseled but before the larvae reach the silks. See EC96-1509, Insect Management Guide for Corn and Sorghum or the Department of Entomology Home page on the World Wide Web (http://ianrwww.unl.edu/ianr/entmol/entdept.htm) for current insecticide recommendations.

Western bean cutworm larvae damage dry beans by feeding on the developing seeds. The damage will reduce the yield but more importantly will reduce bean quality. Pheromone traps should be used to assess egg and larvae populations.

A plastic milk jug can be used to construct a pheromone trap. The sides of a milk jug are removed, the bottom is filled with a water/anti-freeze mixture and a pheromone source is attached to the lid. Male western bean cutworm moths are attracted to the pheromone and get caught in the liquid in the bottom of the trap. Place two traps near vegetation, one on the northwest corner and one on the southeast corner of the field.

At this time, the traps should be monitored daily and total moths counted. When the moth counts begin to decline, the date of the highest number should be determined and the cumulative number of moths caught from the initiation of the flight until the peak should be calculated. If the cumulative number is less than 700, the risk of significant damage is low. If the number is between 700 and 1000 moths per trap, the risk is moderate. If the total moth count is greater than 1000, the risk for damage is significant. When the risk of infestation is moderate or significant, check bean pods about three weeks after the peak in the moth flight. If pod feeding is noticeable, consider an insecticide application.

Western bean cutworm pheromone may be purchased from Ecogen, Inc., 2002 Cabot Blvd. West Langhorn, PA 19047; Gempler’s, Inc., 211 Blue Mounds Rd, Mt. Horeb, WI 53572 or Great Lakes IPM, 10220 Church Rd NE, Vestaburg, MI 48891.

Ron Seymour, Extension Assistant, Integrated Pest Management West Central REC, North Platte
Bob Wright, Extension Entomologist, South Central REC, Clay Center

Roundup Ready rate

(Continued from page 158)

Roundup Ready seed. Similar refunds are available for some Bt corn and for some other new technologies that have fees.
**Corn grazing school, tour July 24**

Information about grazing cattle on corn will be featured at the Grazing Corn Short School and Tour July 24 at Fullerton. It is sponsored by University of Nebraska Cooperative Extension. Registration will begin at 2 p.m. in Fullerton's First National Bank Community Room, followed by two panel discussions — one with producers and one with NU Institute of Agriculture and Natural Resources personnel.

A $15 preregistration fee, which includes supper, is due by July 21.

A 7 to 10 p.m. tour and demonstration at Don Peregrine's farm south of Fullerton requires no preregistration.

This is Peregrine's second year of grazing corn.

For more information on the school or tour, contact Dick Ronnekamp, Extension educator in Boone-Nance counties, (402) 395-2158.

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**GDD and Crop Water Use Data (Through 7/14)**

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Growing degree days required for Type 3 maturity class for the following crops: corn, 2750; soybeans, 2450; and sorghum, 2369.