INTEGRATED PEST MANAGEMENT AND CROP PRODUCTION

EXTENSION
Institute of Agriculture and Natural Resources
UNIVERSITY OF NEBRASKA-LINCOLN
Northeast Research & Extension Center
601 E. Benjamin Avenue, Suite 104
Norfolk, NE 68701-0812
Phone: (402) 370-4000
Fax: (402) 370-4010

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Rootworm School at HAL

Ever wonder how your rootworm control methods worked, or if you are seeing rootworm damage in your rotated corn? On Tuesday, July 24th, we will be having a Rootworm School at the Haskell Ag Lab in Concord. Learn how to identify damage from rootworm larvae, rate roots, and differentiate damage from other possible causes. This ½ day event will be in the afternoon. For more information call Keith Jarvi at (402) 584-3806), cell (402) 649-7347, or Pat Bathke (402) 584-3837. Because of space limitations, the first 25 people who register by contacting Keith or Pat will be accepted. There will be a $10.00 registration fee for refreshments and materials. (KJ)

Soybean Decision Making for Defoliating Insects

Defoliation is the most common type of insect injury observed by Nebraska soybean producers and can occur from emergence to harvest. A complex of insects defoliate soybeans in Nebraska including bean leaf beetle, imported longhorned weevil, grasshopper, woollybear caterpillar, thistle caterpillar, green cloverworm, and a few others. Rarely does any single species reach population levels that defoliate soybean enough to cause economic damage, but the combined injury of two or more defoliating insects can result in economic damage. We observed this in 1997 when the combined defoliation from grasshoppers and bean leaf beetles reached 50% in reproductive stage soybean near Mead, NE. When this occurs we must consult multiple-species recommendations. These can be multiple-species economic threshold tables, or more general 'catch-all' defoliation level recommendations. Because our multiple-species economic threshold tables do not cover all of the different species of insect defoliators we have been seeing this year, we would like to discuss the more general soybean defoliation thresholds.

Insect Defoliation and Yield Loss - Soybean plants have a great capacity to compensate for defoliation by insects. Research over the last 15 years has established that the key factor driving yield losses from defoliating insects is the degree that defoliation reduces light interception of the soybean canopy. Soybean can lose tremendous leaf area without yield loss if the remaining leaves are still intercepting at least 90% of the incident light. So, in making pest management decisions about defoliating insects, a crucial consideration is the size of the remaining soybean canopy. Small canopies cannot tolerate as much leaf loss as large canopies. Another consideration is when defoliation occurs. Unless severe, defoliation in vegetative stages usually doesn't cause yield loss. Reproductive stages are more sensitive. A final factor is growing conditions. When environmental conditions are very favorable for soybean development (e.g. adequate water), plants have a greater capacity for regrowth and compensation.

General guidelines can be used for defoliating insects that lack species-specific thresholds or when two or more different defoliating species are present. In vegetative (pre-flowering) stages consider treatment if the insects are present and feeding and defoliation will reach 40%. In pod-forming or pod-filling stages consider treatment if the insects are present and defoliation will reach 20%. These percentages can vary 5% to 10% according to the stage or type of insect(s) present, environmental conditions, the specific stage of the soybean, and the size and condition of the canopy. Experience will have to be your guide when using these thresholds.

It should be pointed out that defoliation is notoriously difficult to estimate. It is almost always overestimated. This is because the injury is so dramatic and all parts of the canopy often are not considered when making defoliation estimates. Some insect species primarily feed in the upper part of the canopy (e.g. bean leaf beetle), and some feed lower in the canopy. Different portions of the canopy will suffer different levels of injury. Therefore, when estimating defoliation the entire canopy, not just the injured portion, must be considered.

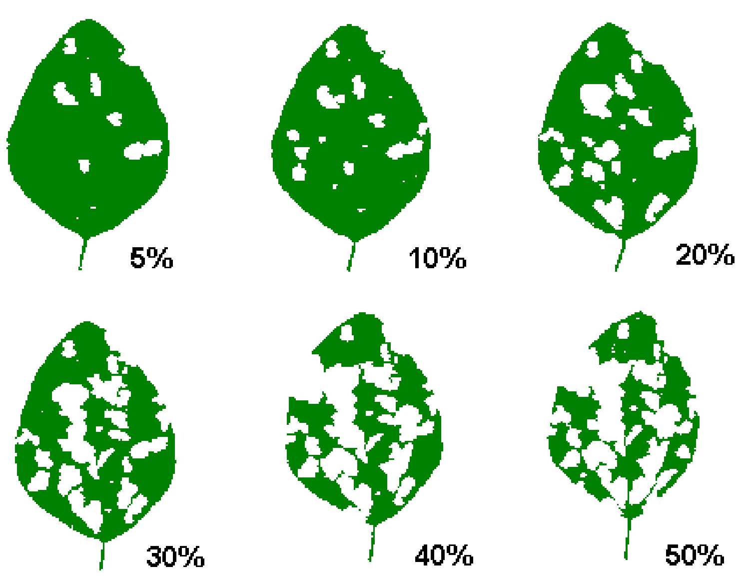
In order to predict if defoliation will reach 40% or 20%, the current injury must be estimated. The following steps are suggested:

1. Remove a trifoliolate leaf from the top, middle, and lower third of 10 randomly selected plants.
2. Discard the most and least damaged leaflet from each trifoliolate leaf. This will leave you with 30 leaflets.
3. Compare the 30 leaflets with the leaflets in Figure 1 and determine the average level of defoliation.
4. Repeat steps 1 - 3 at four or more randomly selected locations in the field.

If defoliation approaches 40% (vegetative soybean) or 20% (pod-forming or pod-filling soybean), then treatment may be warranted if the insects are actively feeding and defoliation is expected to increase.

If treatment is warranted, identify the defoliating insect(s) and use the insecticide guides found at the Entomology Department website located at http://entomology.unl.edu Most of our commonly used foliar insecticides are effective against most soybean defoliators.

Figure 1. Insect defoliation levels of soybean leaflets.



Soybean Aphids Present

Last week we found the first soybean aphids in northeast Nebraska. It's time to begin scouting soybeans for this pest but numbers are still very low and some fields may not have aphids in them yet. The 10 day forecast is for below normal to normal temperatures and this will favor soybean aphid survival.

Soybean Aphid Description - The aphid is light green to pale yellow, less than 1/16th inch long, and has two black-tipped cornicles (cornicles look like tailpipes) on the rear of the abdomen. It has piercing-sucking mouthparts and typically feeds on new tissue near the top of soybean plants on the undersides of leaves. Later in the season the aphids can be found on all parts of the plant. It is the only aphid in North America that forms colonies on soybean.

Life Cycle and Injury to Soybean - The seasonal life cycle of the soybean aphid is complex with up to 18 generations a year. It requires two different species of host plant to complete its life cycle, common buckthorn and soybean. Buckthorn is a woody shrub or tree and is the overwintering host plant of the aphid. Soybean aphids lay eggs on buckthorn in the fall. These eggs overwinter and hatch in the spring, giving rise to wingless females. These females reproduce without mating, producing more females. After two or three generations on buckthorn, winged females are produced that migrate to soybean. Multiple generations of wingless female aphids are produced on soybeans until late summer/fall, when winged females and males are produced that migrate back to buckthorn, where they mate. The females then lay eggs on buckthorn, which overwinter, thus completing the seasonal cycle.

Soybean aphid populations can grow to extremely high levels under favorable environmental conditions. Reproduction and development is fastest when temperatures are in the 70s through the mid 80s (degrees F). The aphids do not do as well when temperatures are in the 90's, and are reported to begin to die when temperatures reach 95 degrees F. When populations reach high levels during the summer, winged females are produced that migrate to other soybean fields. Like a number of other insect species (e.g. potato leafhoppers), these migrants can be caught up in weather patterns, moved great distances, and end up infesting fields far from their origin. These summer migrants were most likely the major source of infestations in Nebraska during the last couple of years.

Soybean aphids injure soybeans by removing plant sap with their needle-like mouthparts. Symptoms of soybeans infested by soybean aphid may include yellowed, distorted leaves and stunted plants. A charcoal-colored residue also may be present on the plants. This is sooty mold that grows on the honeydew that aphids excrete. Honeydew in itself makes leaves appear shiny. Soybean plants are most vulnerable to aphid injury during the early reproductive stages.

Soybean Aphid Occurrence in Nebraska - In much of the soybean aphid's range, significant aphid infestation has often occurred in the early vegetative stages. These infestations then undergo rapid population growth to reach high populations during the flowering stages (R1, R2). During the last few years in Nebraska, however, very few aphids have been found during the vegetative stages. We find a few in late June – early July, but it is usually mid-July before we begin to regularly find aphids, while soybeans are entering or in R3 (beginning pod stage). A few Nebraska aphid populations reach economically damaging populations in late July, but most reach economically damaging populations in August, while soybeans were in the mid-reproductive stages (R4-R5). During 2004 there were many fields where the aphid populations peaked in late R5 (beginning seed) to early R6 (full seed).

Soybean Aphid Natural Enemies - Understanding how natural enemies impact aphid populations is an important component in developing a comprehensive management plan, so the Nebraska Soybean Board funded a project at the Haskell Agricultural Laboratory, Concord, NE that examined the effects of predators and parasitoids on soybean aphid populations. Tierney Brosius, a UNL Entomology Department graduate student, was placed in charge of this project and has discovered some interesting relationships that add to our understanding of the soybean aphid in Nebraska.

For one thing, although the most visible soybean aphid predator is the Asian lady beetle, the minute pirate bug (*Orius insidiosus*) is the most commonly occurring predator. This is a common predator throughout Nebraska that feeds on a variety of small insects and spider mites. The study indicates that naturally occurring predators, primarily minute pirate bug, can significantly slow soybean aphid population growth, and that initial populations of predators may reduce the rate of successful colonization of the soybean aphid. In addition, the presence of minute pirate bugs causes the aphid population to be distributed throughout the canopy, with a higher proportion lower in the canopy than in soybeans without significant levels of minute pirate bugs.

This has important implications for soybean aphid management. *Preserve your natural enemy populations*. Premature or unneeded insecticide use can rid your soybeans of these important control agents and leave your field open for aphid colonization and rapid population growth. For example, do not add an insecticide to a glysophate application simply to "clean up the field". This can lead to later problems with not only the soybean aphid, but with other pests such as the twospotted spider mite. Always remember to treat only when necessary. Aphids must be present with populations growing and reaching economic thresholds. Also, when scouting for aphids make whole plant aphid counts. A significant number of aphids may be in the middle of the canopy.

Of course, this does not mean we can leave the work to the natural enemies and not scout. When environmental conditions favor soybean aphids, they can overcome the effects of the natural enemies and aphid populations can skyrocket. We will continue to do research to determine the environmental and biological conditions that favor the soybean aphid and its natural enemies.

Soybean Aphid Management - Use the following procedures to manage the soybean aphid in Nebraska.

1. **Scouting.** Begin scouting soybean fields once or twice a week in late June to early July. Check 20 to 30 plants per field. Aphids are most likely to concentrate at the very top of the plant early in the season, and will move onto stems and within the canopy as populations grow and/or the plant reaches mid to late reproductive stages. As the season progresses, aphid numbers can change rapidly (populations can double in 2-3 days).
2. **Economic threshold.** *The current recommended threshold for late vegetative through R5 stage soybeans is 250 aphids per plant (field average) with 80% of the plants infested and populations increasing.* This gives you about seven days to schedule treatment before populations reach damaging levels (if populations do not increase during these seven days, you may be able to eliminate or delay treatment). Determining if the aphid population is actively increasing requires several visits to the field. Factors favorable for aphid increase are relatively cool temps, plant stress (particularly drought), and lack of natural enemies.
3. **Natural enemies**. Look for the presence of aphid natural enemies such as lady beetles, minute pirate bugs, and other insect predators. Aphid "mummies" (light brown, swollen aphids) indicate the presence of parasitoids. These predators and parasitoids may keep low or moderate aphid populations in check (under 200 aphids per plant). One can often find soybean aphids by examining plants where lady beetles are observed.

4. **Winged aphids**. Look for the presence of winged aphids. If the majority of aphids are winged or developing wings, the aphids may soon leave the field and treatment can be avoided.
5. **Late treatment.** If the plants are covered with honeydew or sooty mold, or stunted, an insecticide treatment may still be of value but the optimum time of treatment is past.
6. **Test strip.** If fields are treated, leave an untreated test strip to compare against sprayed sections. This also provides a refuge for beneficial insects.
7. **Coverage.** Good insecticide coverage and penetration is required for optimal control of soybean aphid, as many aphids feed on the undersides of the leaves and within the canopy. Use high water volume and pressure. Aerial application works well when high water volume is used (5 gallons of water per acres recommended).
8. **Insecticide selection.** Several insecticides are labeled for the soybean aphid. A list of registered insecticides, rates, preharvest intervals, and grazing restrictions can be found at http://entomology.unl.edu/instabls/soyaphid.htm . Pyrethroids have a relatively long residual. Chlorpyrifos has a fuming action, and may work well in heavy canopies or high temperatures. Dimethoate is least effective.
9. **Bee safety.** Spraying flowering soybean poses a threat to honey bees. Inform treatment plans to nearby beekeepers and follow precautions to minimize honey bee kills. When there is concern about honey bees, pyrethroids are the better insecticide choice.
10. **Not with glyphosate.** We do not generally recommend applying an insecticide at glyphosate application. In Nebraska this is usually before the aphids reach damaging levels, or are even in the field. Insecticide treatment at this time would simply rid the field of natural enemies. In addition, application methods for herbicides (e.g. lower pressures) are not optimal for good insecticide efficacy.
11. **Dual treatment.** If soybean rust is present and being sprayed when soybean aphid thresholds also are met, a fungicide/insecticide tank mix should be effective because application methods for both require high water pressure for adequate penetration and coverage.

More information can be found at entomology.unl.edu or through your local UNL Cooperative Extension office. (KJ & TH)

Western Bean Cutworm Reminder

Western bean cutworm eggs should be increasing in area fields this week. Our light trap counts are peaking about now. Western bean cutworm moths lay eggs in clusters of five to 200 on the top surface of the upper most leaf of a corn plant and on any leaf surface of dry beans. The eggs require five to seven days to develop, during which time the egg color changes to tan and then to purple immediately before they hatch.

After the small, dark brown larvae hatch on corn plant, they move to the whorl or tassel to feed on the tender yellow leaf tissue or on the tassel itself. Once the tassel emerges or if it has already emerged when the eggs hatch, the larvae will move to the green silks. The developing larvae will feed on the green silks moving down the silk channel until they reach the ear tip. The larvae will feed in the ear tip until they are fully developed. If the infestation on one ear tip is so great that the larvae become crowded, a few individuals may move outside the ear and begin to feed on the side of the ear.

Even though field scouting for western bean cutworm in field corn should begin when the first moths are caught, control decisions should be made shortly after the moth flight peaks. The moth flight usually peaks in early-mid July. When scouting for western bean cutworms in corn, check 20 plants in at least five areas of each field. Look for eggs on the top surface of the upper most leaf or look for larvae in the tassel. If 8% of field corn plants, 5% of seed corn plants or 5% of popcorn plants have egg masses or larvae, consider applying an insecticide. Herculex varieties appear to control the larvae very well, although not perfectly, and should not need treating.

Western bean cutworm moths prefer to lay eggs in corn plants that are in the late whorl stage compared to those that have completely tasseled. Pay particular attention to later planted fields or those with uneven development. Western bean cutworm eggs that hatch when corn plants are in the whorl stage of growth have a high rate of survival. The larvae are well protected in the whorl or tassel.

If an insecticide treatment is warranted in corn, it should be made when 95% of the plants in a field have tasseled. This timing of the application increases the chance that the worms will be exposed to the insecticide resulting in better control. Chemigation has provided very good control of this insect, even at lowest labeled rates. Asana, Ambush, Baythroid, Pounce, Lorsban, Capture, Mustang, Penncap-M, Proaxis, Warrior, and Seven are all labeled for control of western bean cutworm. Many generics are also available that will give good control. A list of registered insecticides, rates, preharvest intervals, and grazing restrictions can be found at http://entomology.unl.edu/fldcrops/pestipm.htm (KJ&TH)

Contributing Authors:

Keith J. Jarvi, Editor & IPM Extension Assistant
Charles A. Shapiro, Ext. Soils Specialist
William L. Kranz, Ext. Irrigation Specialist
Stevan Knezevic, Integrated Weed Mgmt. Spec.
Tom Hunt, Extension Entomologist
David P. Shelton, Extension Agricultural Engineer

7/10/2007 CROP WATER USE SUMMARY

Ending on 7/ 9/2007

GDD @ Matur.=Acum. GDD at Maturity

				Past			Future			
		Emerg	Accum	week	3days	day	3days	week	Stage	GDD @
Station	Crop	mon/da	GDD	inches per day					Descrip	Matur
AINSWORTH	Corn	5 5	1117.	0.32	0.35	0.28	0.29	0.30	16leaves 4	2600.
AINSWORTH	Corn	5 19	929.	0.30	0.33	0.27	0.29	0.30	14leaves3.5	2600.
AINSWORTH	Soybean	5 22	871.	0.21	0.24	0.20	0.22	0.24	BegBloom	2500.
AINSWORTH	Soybean	6 5	719.	0.15	0.18	0.16	0.17	0.19	ThirdNode	2500.
AINSWORTH	Potato	5 15	1255.	0.25	0.28	0.23	0.24	0.24	Tuberization	2500.
AINSWORTH	Potato	5 30	1007.	0.19	0.23	0.19	0.21	0.23	Early Tuber	2500.
AINSWORTH	Wheat	4 5	1948.	0.01	0.00	0.03	0.02	0.01	Mature	1800.
AINSWORTH	Grass	4 5	1948.	0.29	0.30	0.24	0.25	0.26	Full Cover	4000.
AINSWORTH	Alfalfa	4 5	1948.	0.29	0.31	0.25	0.27	0.27	Full Cov	4000.
BRUNSWICK	Corn	5 5	1205.	0.35	0.39	0.25	0.27	0.28	16leaves 4	2600.
BRUNSWICK	Corn	5 19	997.	0.34	0.39	0.25	0.27	0.28	16leaves 4	2600.
BRUNSWICK	Soybean	5 22	931.	0.25	0.29	0.20	0.22	0.24	BegBloom	2500.
BRUNSWICK	Soybean	6 5	763.	0.18	0.23	0.16	0.18	0.20	ThirdNode	2500.
BRUNSWICK	Potato	5 15	1334.	0.28	0.32	0.21	0.22	0.22	Tuberization	2500.
BRUNSWICK	Potato	5 30	1070.	0.23	0.28	0.19	0.21	0.22	Early Tuber	2500.
BRUNSWICK	Wheat	4 5	2077.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
BRUNSWICK	Grass	4 5	2077.	0.30	0.33	0.22	0.23	0.24	Full Cover	4000.
BRUNSWICK	Alfalfa	4 5	2077.	0.31	0.35	0.23	0.25	0.26	Full Cov	4000.
CENTRALCITY	Corn	5 5	1243.	0.28	0.30	0.17	0.21	0.24	Silks--HMAX	2600.
CENTRALCITY	Corn	5 19	1029.	0.28	0.30	0.17	0.21	0.24	16leaves 4	2600.
CENTRALCITY	Soybean	5 22	966.	0.21	0.24	0.14	0.18	0.21	BegBloom	2500.
CENTRALCITY	Soybean	6 5	773.	0.15	0.18	0.11	0.14	0.17	ThirdNode	2500.
CENTRALCITY	Potato	5 15	1363.	0.23	0.25	0.13	0.17	0.19	Tuberization	2500.
CENTRALCITY	Potato	5 30	1080.	0.19	0.22	0.12	0.16	0.19	Early Tuber	2500.
CENTRALCITY	Wheat	4 5	2140.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
CENTRALCITY	Grass	4 5	2140.	0.24	0.26	0.14	0.18	0.20	Full Cover	4000.
CENTRALCITY	Alfalfa	4 5	2140.	0.26	0.28	0.15	0.19	0.22	Full Cov	4000.
ELGIN	Corn	5 5	1177.	0.32	0.36	0.26	0.29	0.30	16leaves 4	2600.
ELGIN	Corn	5 19	974.	0.31	0.35	0.26	0.29	0.30	16leaves 4	2600.
ELGIN	Soybean	5 22	911.	0.22	0.26	0.20	0.22	0.24	BegBloom	2500.
ELGIN	Soybean	6 5	751.	0.16	0.20	0.16	0.18	0.20	ThirdNode	2500.
ELGIN	Potato	5 15	1311.	0.26	0.29	0.21	0.23	0.24	Tuberization	2500.
ELGIN	Potato	5 30	1055.	0.21	0.25	0.19	0.21	0.23	Early Tuber	2500.
ELGIN	Wheat	4 5	2061.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
ELGIN	Grass	4 5	2061.	0.28	0.31	0.23	0.24	0.25	Full Cover	4000.
ELGIN	Alfalfa	4 5	2061.	0.29	0.33	0.24	0.26	0.27	Full Cov	4000.
MEADAGROFARM	Corn	5 5	1316.	0.35	0.37	0.14	0.20	0.24	Silks--HMAX	2600.
MEADAGROFARM	Corn	5 19	1092.	0.35	0.37	0.14	0.20	0.24	16leaves 4	2600.
MEADAGROFARM	Soybean	5 22	1032.	0.28	0.31	0.12	0.17	0.21	FullBloom	2500.
MEADAGROFARM	Soybean	6 5	817.	0.20	0.24	0.10	0.14	0.18	BegBloom	2500.
MEADAGROFARM	Potato	5 15	1450.	0.28	0.29	0.11	0.15	0.17	Tuberization	2500.
MEADAGROFARM	Potato	5 30	1156.	0.25	0.28	0.11	0.16	0.19	Early Tuber	2500.
MEADAGROFARM	Wheat	4 5	2211.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
MEADAGROFARM	Grass	4 5	2211.	0.30	0.31	0.12	0.16	0.19	Full Cover	4000.
MEADAGROFARM	Alfalfa	4 5	2211.	0.32	0.34	0.13	0.18	0.22	Full Cov	4000.
MONROE	Corn	5 5	1287.	0.33	0.33	0.17	0.22	0.25	Silks--HMAX	2600.
MONROE	Corn	5 19	1060.	0.32	0.33	0.17	0.22	0.25	16leaves 4	2600.
MONROE	Soybean	5 22	995.	0.25	0.27	0.14	0.19	0.22	FullBloom	2500.
MONROE	Soybean	6 5	793.	0.18	0.20	0.11	0.15	0.18	BegBloom	2500.
MONROE	Potato	5 15	1409.	0.27	0.26	0.14	0.17	0.19	Tuberization	2500.
MONROE	Potato	5 30	1119.	0.23	0.25	0.13	0.17	0.20	Early Tuber	2500.
MONROE	Wheat	4 5	2186.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
MONROE	Grass	4 5	2186.	0.28	0.28	0.14	0.18	0.20	Full Cover	4000.

MONROE	Alfalfa	4	5	2186.	0.30	0.30	0.16	0.20	0.23	Full Cov	4000.
NEWPORT	Corn	5	5	1174.	0.34	0.38	0.29	0.30	0.30	16leaves 4	2600.
NEWPORT	Corn	5	19	969.	0.33	0.37	0.29	0.30	0.30	16leaves 4	2600.
NEWPORT	Soybean	5	22	910.	0.24	0.28	0.22	0.23	0.25	BegBloom	2500.
NEWPORT	Soybean	6	5	745.	0.17	0.21	0.17	0.18	0.20	ThirdNode	2500.
NEWPORT	Potato	5	15	1294.	0.28	0.31	0.24	0.24	0.24	Tuberization	2500.
NEWPORT	Potato	5	30	1037.	0.22	0.26	0.21	0.22	0.23	Early Tuber	2500.
NEWPORT	Wheat	4	5	2028.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
NEWPORT	Grass	4	5	2028.	0.30	0.33	0.25	0.26	0.25	Full Cover	4000.
NEWPORT	Alfalfa	4	5	2028.	0.31	0.34	0.27	0.27	0.27	Full Cov	4000.
CONCORD(NE)	Corn	5	5	1227.	0.34	0.38	0.27	0.29	0.29	Silks--HMAX	2600.
CONCORD(NE)	Corn	5	19	1010.	0.33	0.38	0.27	0.29	0.29	16leaves 4	2600.
CONCORD(NE)	Soybean	5	22	945.	0.25	0.29	0.22	0.23	0.25	BegBloom	2500.
CONCORD(NE)	Soybean	6	5	764.	0.18	0.22	0.17	0.18	0.20	ThirdNode	2500.
CONCORD(NE)	Potato	5	15	1348.	0.28	0.30	0.22	0.23	0.23	Tuberization	2500.
CONCORD(NE)	Potato	5	30	1071.	0.23	0.27	0.20	0.22	0.23	Early Tuber	2500.
CONCORD(NE)	Wheat	4	5	2089.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
CONCORD(NE)	Grass	4	5	2089.	0.30	0.32	0.23	0.24	0.24	Full Cover	4000.
CONCORD(NE)	Alfalfa	4	5	2089.	0.31	0.34	0.25	0.26	0.27	Full Cov	4000.
ONEILL	Corn	5	5	1148.	0.34	0.36	0.30	0.30	0.29	16leaves 4	2600.
ONEILL	Corn	5	19	946.	0.32	0.35	0.30	0.30	0.29	14leaves3.5	2600.
ONEILL	Soybean	5	22	885.	0.23	0.26	0.22	0.22	0.23	BegBloom	2500.
ONEILL	Soybean	6	5	728.	0.16	0.19	0.17	0.18	0.19	ThirdNode	2500.
ONEILL	Potato	5	15	1266.	0.27	0.30	0.25	0.24	0.23	Tuberization	2500.
ONEILL	Potato	5	30	1015.	0.21	0.24	0.21	0.21	0.22	Early Tuber	2500.
ONEILL	Wheat	4	5	2010.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
ONEILL	Grass	4	5	2010.	0.30	0.31	0.26	0.25	0.25	Full Cover	4000.
ONEILL	Alfalfa	4	5	2010.	0.31	0.33	0.27	0.27	0.27	Full Cov	4000.
WESTPOINT	Corn	5	5	1258.	0.33	0.37	0.21	0.24	0.26	Silks--HMAX	2600.
WESTPOINT	Corn	5	19	1041.	0.33	0.37	0.21	0.24	0.26	16leaves 4	2600.
WESTPOINT	Soybean	5	22	976.	0.25	0.30	0.17	0.20	0.22	FullBloom	2500.
WESTPOINT	Soybean	6	5	774.	0.18	0.22	0.13	0.16	0.18	ThirdNode	2500.
WESTPOINT	Potato	5	15	1379.	0.27	0.30	0.17	0.19	0.20	Tuberization	2500.
WESTPOINT	Potato	5	30	1089.	0.22	0.27	0.16	0.19	0.20	Early Tuber	2500.
WESTPOINT	Wheat	4	5	2141.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
WESTPOINT	Grass	4	5	2141.	0.29	0.32	0.18	0.20	0.21	Full Cover	4000.
WESTPOINT	Alfalfa	4	5	2141.	0.30	0.34	0.19	0.22	0.23	Full Cov	4000.
YORK	Corn	5	5	1258.	0.32	0.32	0.17	0.22	0.25	Silks--HMAX	2600.
YORK	Corn	5	19	1042.	0.31	0.32	0.17	0.22	0.25	16leaves 4	2600.
YORK	Soybean	5	22	984.	0.24	0.26	0.14	0.18	0.21	FullBloom	2500.
YORK	Soybean	6	5	780.	0.17	0.19	0.11	0.14	0.18	BegBloom	2500.
YORK	Potato	5	15	1389.	0.26	0.26	0.13	0.17	0.19	Tuberization	2500.
YORK	Potato	5	30	1100.	0.22	0.23	0.13	0.17	0.20	Early Tuber	2500.
YORK	Wheat	4	5	2157.	0.00	0.00	0.00	0.00	0.00	Mature	1800.
YORK	Grass	4	5	2157.	0.27	0.27	0.14	0.18	0.20	Full Cover	4000.
YORK	Alfalfa	4	5	2157.	0.29	0.29	0.15	0.20	0.22	Full Cov	4000.