RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

FIELD CROPS/LIVESTOCK EDITION $1.50 AUGUST 3, 2000

INSIDE

Hole-y Soybeans!? Understanding Defoliation and Its Effects

Daniel Kluchinski, Mercer County Agricultural Agent

Throughout the growing season, soybeans can be a source of food for foliage feeding insects or defoliators. Examples of such defoliators include **Mexican bean beetle**, **Japanese beetle**, **grasshoppers**, **bean leaf beetles**, **green cloverworm** and others. As the insects eat the leaves, they reduce the amount of plant tissue needed to produce food through photosynthesis. Thus, their activity can be detrimental to soybean growth or yield as the amount of food produced for vegetative growth or grain is reduced. However, not all damage may be of economical concern even though many growers worry when they see leaves on plants starting to look like Swiss cheese or lace. Knowing the insect, the extent of damage, and the relationship between the plant growth stage and yield loss, may bring some peace of mind or can be a call to action.

Regardless of the type of insect feeding on the plant, it is important to know that defoliation can have similar effects. As mentioned earlier, leaf tissue is important for photosynthesis or food production that fuels plant growth, grain fill and yield. However, the amount of damage that a soybean plant can sustain and still have little to no effect varies with growth stage, growing conditions and vigor. According to G. P. Dively, Extension Entomologist with The University of Maryland:

> "During the early seedling stage, damage to the cotyledons [seed leaves] and leaves may result in some stand reduction, but the capacity of the plants to recover is remarkable. A field that has a good stand can compensate for reductions up to 30 percent of the plant density before yield is affected, if other growing conditions are adequate…During the vegetative states when the plants are growing and producing new leaves (before bloom), and again after seed enlargement is complete, soybeans can tolerate 30 to 40 percent defoliation without significant loss of yield. Vegetative growth usually slows down or actually stops at the time pods begin to fill; thus, plants are more sensitive during pod development and seed enlargement when more than 20 percent defoliation can cause economic yield loss."

Therefore, if defoliation were noted in a field, the first decision-making step would be to determine the plant stage of growth. Next

SEE DEFOLIATION ON PAGE 2

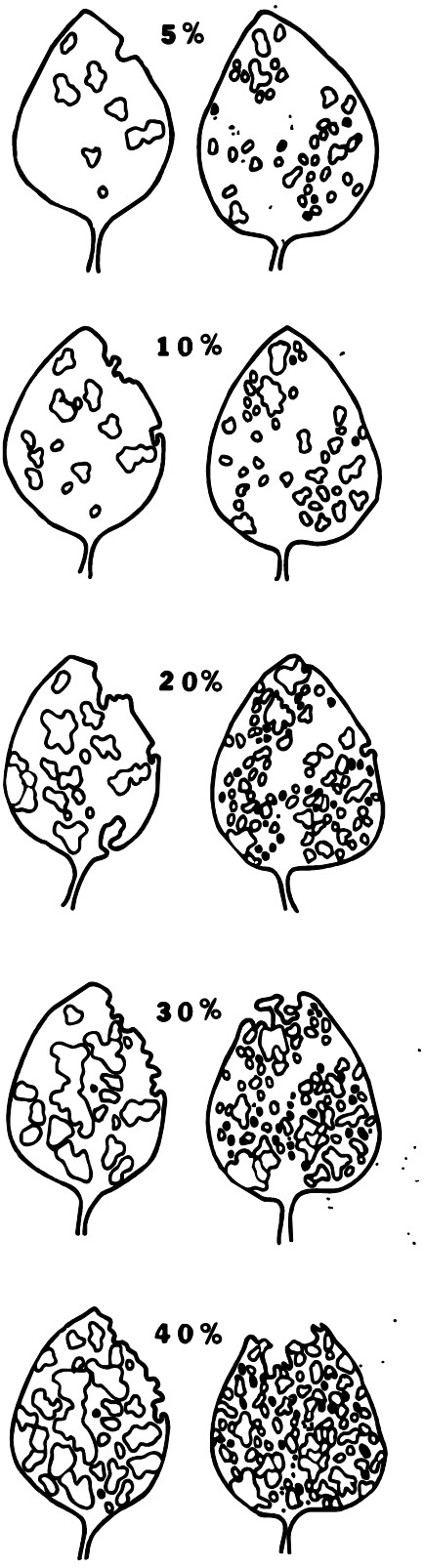

Figure 1. Percent defoliation guide showing examples of various defoliation levels caused by green cloverworn (left) and Mexican bean beetle (right). *G. P. Dively, 1986.*

DEFOLIATION FROM PAGE 1

would be to determine the level of defoliation. Then use these two pieces of information to determine if any stand or yield loss may be occurring. The following method should be used to estimate defoliation:

- subsampling one leaf from the field in the upper third of the foliage
- subsampling four leaflets from the lower two thirds of the plant,
- estimating defoliation using standard defoliation guides (See figure 1) to the nearest 10 percent, and;
- averaging the values to get an overall defoliation percentage.

Using growth stage and percent defoliation alone can be a useful tool in determining potential loss. However, determining the specific pest and its threshold should also be done. Combining this information with field defoliation data uses an integrated pest management (IPM) approach that will provide the best site-specific information and recommendation. Following is information on common soybean defoliator insects in New Jersey. In addition to descriptions of the insect, action thresholds for each insect are listed. These would be used to determine if damage is below any action threshold, or if control measures are necessary.

✔ **Mexican bean beetle:** These beetles can cause damage throughout the growing season (May through September) as larvae and adults. The larvae are yellow, soft, grublike with six rows of branched spines across the back, and their growth stages can range in size from 1.5 – 9 millimeters (mm) long. The adults have a round body, yellow to copper in color, 16 spots on the wings (eight on each wing cover in 3 rows across the back). They are 6-8 mm long. The feeding damage will skeletonize the leaves, leaving many veins intact and giving the leaf the look of lace. Threshold: 30% defoliation before bloom, 20% after bloom. These are often parasitized by beneficial insects and generally do not require insecticide treatment.

✔ **Japanese beetles:** These beetles can cause damage throughout the growing season (June through September) as adults. There is one generation per year. The adult has a shiny metallic green body with bronze colored wing covers. There are 2 white spots at the tip of the abdomen and a row of white spots along the abdomen. The injury occurs primarily on the upper foliage, and holes are often large with ragged edges with the veins intact. Threshold: 20% defoliation during bloom.

✔ **Grasshoppers:** These insects can cause damage throughout the growing season (June through October) as nymphs and adults. There is one generation per year. Feeding damage are large holes often with ragged edges while the leaf veins remain intact. If severe, the main vein may only be left. Threshold is 30-45 nymphs per yd^2 or 8-14 adults per yd^2.

✔ **Bean leaf beetle:** These beetles can cause damage throughout the growing season (May through September) as larvae and adults. There is usually one or two life generations per season. The larvae are white, cylindrical with a black head and anal shield. The adults have an oval shaped body, a small black triangle at the base of the wing covers, are yellow-green, tan or red in color, and usually have four black spots on the wing covers. These cause small rounded holes, usually within the interveinal areas of the leaves. Threshold: 30% defoliation and 5 or more beetles per foot of row.

SEE INSECTS ON PAGE 3

Alfalfa Variety Selection

Jeremy W. Singer, Ph.D., Field and Forage Crops

My last article focused on assessing alfalfa stands to identify candidates for rotation. This article will cover alfalfa variety selection for those fields that will be rotated into alfalfa. Numerous alfalfa varieties are marketed in New Jersey. Selecting the best varieties for your farm requires some information gathering.

The best place to look for information that will assist you in variety selection is the 1999 Pennsylvania Forage Trials Report. The report contains alfalfa yield data on a dry matter basis, dormancy ratings, pest resistance, and stand score. Information on red clover yields and pest resistance and cool-season grass yield, maturity dates, and stand score are also presented.

The best way to utilize the information is to first determine which site is similar to your farm location. The trials are conducted annually at Rock Springs (upland site) and Landisville. Although one of these sites may be closer to the conditions on your farm, performance data from both sites should be evaluated because varieties that do well at both sites are probably adapted to more diverse environmental conditions. Furthermore, production data from several years can provide insights because certain varieties decline with time more rapidly than others. Disease and insect resistance ratings should also be considered, especially if you have moderately to poorly drained soils on your farm.

Four years of yield data are available from the study seeded in the spring of 1995. Not all varieties seeded at one site were represented at the other. Nevertheless, Seedway 512 was number one at Rock Springs and number four at Landisville, Chemgro Magnum V was number two at Rock Springs and number one at Landisville, and Pioneer 5454 was number three at Rock Springs and number two at Landisville. Clearly, these varieties were developed to tolerate varying environmental conditions.

More recently, the study seeded in 1997 has two production years of data available. Agway Stampede was number two at Rock Springs and number one at Landisville, Monsanto DK140 was number four at Rock Springs and number three at Landisville, while Doebler's Pristine was number one at Rock Springs and number three at Landisville. The intent in mentioning yield rank is to highlight yield stability across location. To determine whether yield differences are statistically different from other alfalfa entries, obtain a copy of the full report that is available from the Penn State publications distribution center at 814-865-6713. ❑

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✔ **Green Cloverworm:** The larval stage can cause damage from May to October. There are 2 generations per season. The larvae differ from other soybean caterpillars by having 3 pairs of abdominal prolegs (others only have 2 or 4 pairs) and one pair of anal prolegs. The larvae have a white horizontal strip running along each side of the body. The larvae cause a windowpane effect when their mouthparts scrape the leaves, rather than chewing holes through the leaf. Threshold: 20% defoliation and 12 worms per foot of row.

For information on control measures, when warranted, consult the *2000 Pest Management Recommendations for Field Crops* or contact your local county agent.

References:

G. P. Dively. 1986. Soybean defoliation guide. Pest management aid No.16. The University of Maryland Cooperative Extension Service, College Park-Eastern Shore, MD.

L. G. Higley and D. J. Boethel. (editors). 1994. Handbook of soybean insect pests. Entomological Society of America, Lanham, MD. ❑

New Cornell Video: How to Manage Flies Around Confined Livestock

Two common pests on dairy farms, the house fly and stable fly, can lower milk production, reduce feed conversion efficiency, expose the herd to disease-causing organisms and cause blood loss.

Flies mature so rapidly that under ideal breeding conditions, one house fly can generate 300 million offspring in three months. Since house and stable flies easily develop resistance to insecticides, management can become a difficult chore.

A new 35-minute video from Cornell Cooperative Extension, Integrated Fly Management Around Confined Livestock, tells how to monitor and manage fly populations effectively.

The steps to success include understanding the life cycle of the fly and its requirements for breeding; identifying breeding areas that need to be eliminated; practicing sanitation so that stalls, pens, feed preparation areas and other "hot spots" are kept clean; using beneficial organisms; and applying appropriate insecticides properly and in the right places when needed.

This video shows each step in detail. Part one introduces the identification and biology of house and stable flies. Part two describes how to monitor for these pests and manage them with an integrated approach. Fly populations on IPM farms are 50% lower than on non-IPM farms.

The Integrated Fly Management Around Confined Livestock video (622VIFM) is available from the Cornell Cooperative Extension Media and Technology Services Resource Center, 7 Cornell BTP, Ithaca, NY 14850, for $24.95 which includes a copy of the IPM fact sheet Integrated Management of Flies in and Around Dairy and Livestock Barns, (102DMFS450), handling and shipping. ❑

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged much below normal. Extremes were 89 at Pemberton on the 31st and 41 degrees at Belvidere on the 27th. Weekly rainfall averaged 2.26 inches north, 3.07 inches central, and 2.57 inches south. The heaviest 24 hour total was 4.77 inches at Long Branch on the 26th to the 27th. Estimated soil moisture, in percent of field capacity, this past week averaged 87 percent north, 85 percent central and 79 percent south. Four inch soil temperatures averaged 68 degrees north, 71 degrees central and 72 degrees south.

Weather Summary for the Week Ending 8 am Monday 7/31/00

	RAINFALL			TEMPERATURE				GDD	BASE50	MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	2.11	26.41	6.84	83	41	68.	-6	1543	-11	98
CANOE BROOK	3.00	19.34	-1.31	80	62	69.	-6	1695	148	98
CHARLOTTEBURG	2.58	22.02	1.21	82	55	66.	-7	1247	57	100
FLEMINGTON	1.37	19.18	-.83	83	59	71.	-3	1742	149	83
LONG VALLEY	2.23	21.19	-.23	83	58	69.	-4	1385	17	92
FREEHOLD	2.40	15.37	-4.02	82	61	71.	-4	1871	162	89
LONG BRANCH	5.53	23.11	3.85	79	64	70.	-5	1632	1	82
NEW BRUNSWICK	2.69	18.88	-.48	82	64	71.	-4	1801	4	91
PEMBERTON	2.06	17.40	-2.02	89	62	72.	-4	2274	525	73
TOMS RIVER	3.78	21.78	1.88	83	60	71.	-4	1777	140	69
TRENTON	1.95	17.53	-1.02	84	63	71.	-6	1874	4	74
CAPE MAY COURT HOUSE	2.72	19.82	2.69	83	63	72.	-4	1846	102	71
DOWNSTOWN	2.94	21.58	3.48	86	62	72.	-5	1946	64	100
GLASSBORO	2.83	21.66	2.58	87	66	73.	-3	2075	218	93
HAMMONTON	2.12	18.91	-.24	86	61	72.	-5	1880	24	74
POMONA	3.42	21.90	4.66	83	63	71.	-4	1814	84	72
SEABROOK	1.19	20.75	3.23	85	65	73.	-4	2048	159	70
ATLANTIC CITY MARINA	2.75	19.37	2.86	81	69	73.	-2	1853	211	69
SOUTH HARRISON	2.13	24.26	4.94	86	64	77	NA	2036	NA	NA

Maximum thermometer at Pemberton has been replaced. Temperatures have been averaging much too high and therefore Growing degree days units are too high.

WES KLINE — GDD BASE 40 PINEY HOLLOW Last Week 226 (Ending 7/24/00) This Week 229 (Ending 7/31/00)

Rutgers Cooperative Extension - NJAES
U.S. DEPARTMENT OF AGRICULTURE
Rutgers -The State University of New Jersey

Plant & Pest Advisory
18 College Farm Road
Cook College
New Brunswick, N.J. 08901-8551

PLANT & PEST ADVISORY
FIELD CROPS/LIVESTOCK EDITION
CONTRIBUTORS

Rutgers Cooperative Extension Specialists
George Hamilton, Ph.D., Pest Management
Joseph R. Heckman, Ph.D., Soil Fertility
Bradley A. Majek, Ph.D., Weed Science
Jeremy Singer, Ph.D., Field and Forage Crops
Michael L. Westendorf, Ph.D., Animal Science
RCE County Agricultural Agents and Program Associate
Burlington, William J. Bamka (609-265-5757)
Hunterdon, Robert C. Mickel (908-788-1338)
Mercer, Daniel Kluchinski (609-989-6830)
Monmouth, Bill Sciarappa, Ph.D., (732-431-7260)
Salem, David L. Lee (856-769-0090)
Sussex, Daniel Wunderlich (973-579-0985)
Warren, Everett A. Chamberlain (908-475-6503)
University of Delaware Cooperative Extension
Mark Van Gessel, Ph.D., Weed Science
North Jersey Resource Conservation & Development Council
Brian Aldrich (908-852-2576, ext.113)
Newsletter Production
Jack Rabin, Assistant Director, NJAES
Cindy Rovins, Editor and Designer