

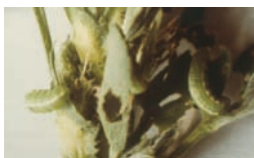
ALFALFA MANAGEMENT



INSECT SCOUTING CALENDAR FOR ALFALFA

Pest	April	May	June	July	August
Alfalfa Weevil					
Potato Leafhopper					
Meadow Spittlebug					
Aphids					

ALFALFA WEEVIL

*Larvae**Damage*

Identification & Incidence: Overwintering adult weevils become active during the first warm days of spring and deposit eggs, which hatch into larvae that may defoliate the 1st cutting. Larvae pass through 4 instar stages ranging in size from 1/8 to 1/2 inch and then pupate in a fibrous pupal case before transforming to adults. Life cycle includes one generation per year in Ohio.

Sampling: A larval count is made by collecting 10 stems from a location and shaking the stems in a bucket to dislodge the larvae. This is repeated until 30 stems have been sampled.

Economic Threshold: Treatment is based on the stand height, tip feeding and number of larvae per stem.

Action thresholds relevant to stand height, tip feeding and density of larvae per stem.			
Stem ht (Inches)	Indication of problem % tip feeding	Larva Sampled/ Stem	Action Needed
6	25	1	Check in 7 days
9	50	> 1	Spray
12	75	> 2	Spray or harvest
16	100	> 4	Harvest early

Management Options: If sampling indicates potential for economic injury and alfalfa cannot be harvested early, rescue treatment is warranted. Parasitic wasps and fungal diseases prevent weevils from causing economic injury in most years. For a list of labeled insecticides, see <http://entomology.osu.edu/ag/>.

POTATO LEAFHOPPER



Adult



Nymph

Identification & Incidence: Migrating PLH populations become established on Ohio alfalfa during the 2nd cutting and may reduce yields until late August. Foliar injury is indicated by yellowing of foliage, termed hopperburn, and plants are stunted. Critical periods of injury occur from 2nd cutting to early 4th cutting.

Sampling: Prediction of PLH injury depends on detection of abundant PLH presence prior to onset of foliar injury. Sweep net sampling is most effective method.

Economic Threshold: Potential for economic injury exists when number of PLH per 10 sweeps exceeds height of stand expressed in inches. Threshold may be increased during periods of vigorous growth or decreased during periods of stand stress. Presence of PLH nymphs in abundance indicates high potential for injury. Action thresholds for resistant varieties are 3X the thresholds for regular varieties.

Action thresholds for control of PLH			
	Alfalfa Tolerance for Stress		
Stand Ht	Low	Medium	High
<i>Inches</i>	<i>Action Threshold of PLH/10 Sweeps</i>		
6	3	6	9
10	5	10	15
16	8	16	24
20+	10	20	30

Management Options: Timely harvests will reduce PLH population development and impact. New seedings are especially vulnerable and should be monitored closely. The use of PLH resistant alfalfa is an alternative to the use of foliar treatments, although these cultivars should be watched closely during the establishment year for possible damage. For a list of labeled insecticides, see <http://entomology.osu.edu/ag/>.

MEADOW SPITTLEBUG



Adult

In the spring, 1st cutting alfalfa may have significant numbers of spittle masses, which provide an environment for development of MSB nymphs feeding on the plant host. Although treatment for MSB alone is rarely warranted, the presence of 1 or more spittle masses per stem plus a marginal weevil infestation may warrant a rescue treatment.

GREEN PEA APHID

Aphids may become very abundant on alfalfa and should not be confused with leafhoppers, since many aphids are required to cause economic injury. If a cup or more of aphids are collected in 10 sweeps, control may be warranted.

ALFALFA BLOTCH LEAFMINER



Blotch Mine

Blotch mines in alfalfa foliage are caused by the Alfalfa blotch leafminer (ABLM), which pass through multiple generations per year. In general, this leafmining fly is controlled by beneficial wasps. If 50% or more of alfalfa leaflets exhibit blotch mines, control may be warranted.

TIME OF DISEASE OCCURRENCE IN ALFALFA

Pest	April	May	June	July	Aug	Sept	Oct
Phytophthora root rot							
Sclerotinia crown & stem rot							
Lepto leaf spot							
Verticillium wilt							
Spring black stem							
Anthracnose							

PHYTOPHTHORA ROOT ROT



Description: Plants are stunted with yellow, red, or purple leaves. Dark brown to black lesions occur on tap roots. Frequently the lower portion of the tap root is rotted off immediately below the crown region. *Phytophthora* also causes damping off, with seedlings failing to emerge or collapsing at the soil surface.

Location: Phytophthora root rot occurs throughout Ohio. It is especially severe on heavy, poorly-drained soils. Symptoms are frequently seen in low areas or between tile lines, while plants in drier areas appear healthy.

Time of Attack: Infection can occur at any time during spring and summer if the soil is water-saturated.

Management:

- Resistant varieties
- Seed treatment
- Improve soil drainage

SCLEROTINIA CROWN AND STEM ROT



Description: Soft mushy stems with masses of cottony growth are clear signs of Sclerotinia crown and stem rot. Hard, black sclerotia, 1/8 to 1/4 inch in diameter form on diseased stems and crowns.

Location: The disease occurs throughout Ohio, but is most common in late summer (August) seedlings, especially when minimum tillage methods are used.

Time of Attack: Infection by Sclerotinia takes place in the fall. Plants die throughout the winter and spring, with symptoms most conspicuous in April and early May. Symptoms are rarely seen after the first harvest.

Management:

- Early August or spring planting
- Till problem field before planting

LEPTO LEAF SPOT



Description: Leaf lesions begin as pinpoint-sized dark spots. Older lesions are oval with tan centers and dark brown borders. Most lesions are surrounded by a yellow “halo.” Heavily infected leaves turn brown and drop.

Location: Lepto leaf spot occurs throughout Ohio.

Time of Attack: Infection can occur throughout the growing season whenever foliage remains wet for an extended period.

Management:

- Resistant varieties
- Cut frequently

VERTICILLIUM WILT



Description: Symptoms usually do not become obvious until the third year after seeding. Affected plants are scattered throughout a field. Upper leaflets turn yellow or pink and often curl or twist. Stems are stunted but remain erect.

Location: Verticillium wilt has been found in 17 counties in central and northeastern Ohio. It has not been reported south of Interstate 70.

Time of Attack: Verticillium wilt usually spreads within a field and to neighboring fields on infested harvesting equipment. Infection can occur throughout the growing season.

Management:

- Resistant varieties

SPRING BLACK STEM



Description: Black lesions occur on lower leaves and stems. The entire lower portion of the stem may be blackened and brittle. Heavily infected leaves turn yellow and drop.

Location: Spring black stem occurs throughout Ohio.

Time of Attack: Infection takes place primarily during cool, wet periods in the spring and fall. Most damage occurs in the spring, prior to the first harvest.

Management:

- Monitor soil pH and fertility
- Frequent cutting

ANTHRACNOSE



Description: Diamond shaped lesions occur near the base of the stem. Lesions are tan with dark brown borders. Infected stems wilt, producing the characteristic "shepherd's crook" symptom. When crowns are invaded the inner tissues turn bluish black and the plant dies.

Location: Anthracnose occurs throughout Ohio on susceptible alfalfa varieties.

Time of attack: Anthracnose occurs during relatively hot weather, from June through September. The spores are spread from plant to plant by splashing rain or by means of infested harvesting equipment.

Management:

- Resistant varieties

ALFALFA STAND EVALUATION

Evaluate the stand visually in early spring or fall by estimating the alfalfa ground cover when the stand has 4 to 6 inches of new growth.

% alfalfa ground cover	Yield potential
>80%, good vigor	Excellent
60-80%, good vigor	Fair to Good
40-60%, fair to poor vigor	60% of normal
20-40%, poor vigor	<50% of normal

Once per year, estimate the actual plant density and assess crown and root health. Dig and count the alfalfa plants in a 1 to 2-square foot area in several random locations in the field. Do not count plants having greater than 50% root rot.

Plant density guidelines based on stand age:

Year	Minimum plants/ft²
Fall of seeding year	25–30
2nd	10–15
3rd or older	5–6

Split open alfalfa roots lengthwise to observe tissue health. In healthy stands, fewer than 30% of plants will show significant discoloration and rot in the crown and taproot, and vigorous crown shoots are symmetrically distributed around the crown. Weak stands with a high percentage of plants having greater than 50% crown and root rot should be interseeded with another legume or grass, or should be rotated to another crop.

ALFALFA RESEEDING GUIDELINES

Recommendations for reseeding alfalfa stands differ by age of the stand. This is because older alfalfa stands have a buildup of pathogens and the plants release compounds that are toxic to new alfalfa seedlings (autotoxicity).

Reseeding in the First Year

- Disk down or kill a seeding failure and reseed in late summer after a spring seeding attempt, or the following spring after a late summer seeding attempt. Autotoxicity is not a problem within the first year.
- Reseed gaps in the stand as soon as possible in the first year.

Reseeding After Older Alfalfa Stands

- The best practice for long term productivity is to rotate out of alfalfa for at least a year.
- Do not interseed alfalfa to thicken a stand that is more than one year old. Autotoxic compounds and competition from existing plants prevents successful long-term stand improvement. Interseed another legume or grass to lengthen life of the forage stand.
- If crop rotation is not a viable solution, kill the alfalfa stand in the fall and seed alfalfa the next spring. Alternatively, kill the alfalfa stand in the spring, rotate to a summer annual crop, and reseed to alfalfa in August.
- Research demonstrates that yields will be lower where the interval between alfalfa stands is less than one year.

ALFALFA HARVEST MANAGEMENT

Harvest management affects alfalfa yield, quality and stand persistence. In Ohio, alfalfa is well adapted to a four-cut system for the best compromise of yield and forage quality.

The desired forage quality goal should guide the timing of harvest. A method for estimating neutral detergent fiber (NDF) content of the standing alfalfa crop is described on the next two pages.

When timothy or smooth bromegrass are included in the stand, do not cut until the grass is in early heading stage to prevent damage to the grass stand. These grasses are best adapted to a 3-cut schedule with alfalfa. Alfalfa mixtures with orchardgrass, perennial ryegrass, tall fescue, and reed canarygrass can be harvested on a 4-cut schedule. Cutting alfalfa 5 times per season will increase forage quality, but will likely reduce stand persistence.

Allow alfalfa to reach early to mid-flower stage during one growth cycle to improve stand persistence. This should occur in late summer, because forage quality does not decline as quickly in late summer with advancing maturity as it does earlier in the year.

ESTIMATING ALFALFA QUALITY IN THE FIELD

1. Choose a representative 2-square-foot area in the field. Determine the maturity of the most mature stem in the sampling area (vegetative, bud, or flower).
2. Measure the length of the longest stem (from soil surface) in the 2-square-foot sampling area. Pull the stem to its full length for an accurate measurement.
3. Use the chart on the next page to determine estimated neutral detergent fiber (NDF) of the standing alfalfa crop.

Example: Longest stem is 28 inches, most mature stem has buds; NDF = 38%.

4. Repeat steps 1 to 3 in four or five representative areas across the field and take the average.

NOTE: This procedure does not account for changes in quality due to harvesting and storage. These factors may further raise NDF content by 3 to 6 units or more. Therefore, begin harvesting when the NDF of the standing forage is 4 to 6 units lower than the desired goal. Mixed alfalfa-grass stands should be harvested even earlier.

This procedure is most accurate in healthy stands of pure alfalfa not under stress.

ESTIMATING ALFALFA NDF IN FIELD

Length of Tallest stem (inches)	Stage of Most Mature Stem		
	Vegetative	Bud	Flower
	----- % NDF -----		
16	28.5	29.7	31.4
17	29.2	30.4	32.0
18	29.9	31.1	32.7
19	30.6	31.8	33.4
20	31.3	32.5	34.1
21	32.0	33.2	34.8
22	32.7	33.9	35.5
23	33.4	34.6	36.2
24	34.0	35.3	36.9
25	34.7	35.9	37.6
26	35.4	36.6	38.3
27	36.1	37.3	38.9
28	36.8	38.0	39.6
29	37.5	38.7	40.3
30	38.2	39.4	41.0
31	38.9	40.1	41.7
32	39.6	40.8	42.4
33	40.3	41.5	43.1
34	40.9	42.2	43.8
35	41.6	42.8	44.5
36	42.3	43.5	45.2
37	43.0	44.2	45.8
38	43.7	44.9	46.5

ALFALFA FALL HARVEST TIMING

Reduce winter injury risk by taking the last harvest by September 7 in northern Ohio and September 15 in southern Ohio. Cutting in late September to mid-October disrupts accumulation of energy and protein reserves in alfalfa taproots used for winter survival and spring regrowth.

Sometimes cutting in the fall cannot be avoided. Below are strategies to reduce the risk of stand injury and yield reductions the next year.

Reducing Risk of Fall Cutting

- Limit fall cutting to stands where harvest intervals during the growing season were long. Allow a growth interval of 45 days before a fall harvest. A 3rd cutting during the fall is less risky than a 4th or 5th cutting.
- Maintain optimal soil fertility levels (pH, P and K) to keep the stand healthy.
- Disease resistant, winter hardy varieties will lessen the risk of injury from fall harvesting.
- Do not cut fields that suffered significant stress (e.g. wet soils, potato leafhopper injury) during the growing season.
- Cut after a killing frost (25°F) in late October or early November on well-drained soils not prone to heaving. Leave a 6-inch stubble. Late removal of plant cover increases the risk of frost heaving on soils prone to heaving.
- Top grazing of alfalfa in the fall can be practiced if soils are firm.
- Do not fall harvest or graze a late summer seeding.

NUTRIENT DEFICIENCY SYMPTOMS IN ALFALFA

Nitrogen

- deficiency due to poor nodulation
- plant is stunted and has a light green appearance, rounded leaflets with yellowing on tips
- firing on lower leaves first, develops into necrosis (brown tissue), eventually leaves will fall off (abscise)

Phosphorus

- plants are dark green, spindly and stunted
- petioles and leaflets are tilted upward, lower leaves may show firing
- stems may turn red
- reduced nodulation

Potassium

- stunted plants
- yellow to white spots along leaf tips and margins

Calcium

- delayed emergence of primary leaves which when emerged may appear cup shaped, and necrotic
- chlorotic bands appear around the rest of the leaves
- terminal buds deteriorate and petioles break down

Magnesium

- interveinal chlorosis in which the base and lower center of the leaf are not affected.
- downward curling of leaf margins and yellowing from the margin inward

Sulfur

- leaves including veins turn pale green to yellow
- young leaves are affected first
- terminal buds remain alive

NUTRIENT DEFICIENCY SYMPTOMS IN ALFALFA (cont.)

Manganese

- interveinal chlorosis (not always distinct), buds remain alive
- spots of dead tissue appear on the leaves

Iron

- interveinal chlorosis, buds remain alive
- sharp color contrast between veins and the leaf
- spots of dead tissue appear on the leaves

Boron

- stunted growth, distortions at the tips or base of young leaves, terminal bud is dead.
- leaves near the growing point are yellowed and sometimes reddened, while lower leaves appear healthy (sometimes confused with "hopper burn")
- internodes are shortened, stems cracked, buds can be absent, distorted, light brown in color or dead
- pink to whitish-yellow spots at leaf base

Copper

- young leaves may wilt, wither and shed without appearing chlorotic

Zinc

- growth is stunted
- interveinal chlorosis, brown spots, and dead tissue

Molybdenum

- see nitrogen deficiency (same deficiency symptoms)

POTASH (K₂O) RECOMMENDATIONS FOR ALFALFA AT VARIOUS YIELD POTENTIALS, CEC'S & SOIL TEST LEVELS.

Yield Potentials	ton/acre	5	6	7	8	9
Soil Test K		lb K₂O per acre³				
ppm (lb/acre)	CEC	5 meq/100g				
25 (50) ¹		300	300	300	300	300
50 (100)		300	300	300	300	300
75 (150)		285	300	300	300	300
88 (175) ²		270	300	300	300	300
110 (220)		150	175	205	230	260
130 (260)		40	50	55	65	70
140 (280)		0	0	0	0	0
	CEC	10 meq/100g				
25 (50)		300	300	300	300	300
50 (100)		300	300	300	300	300
75 (150)		300	300	300	300	300
100 (200) ²		270	300	300	300	300
120 (240)		160	190	220	250	280
140 (280)		55	65	75	85	95
150 (300)		0	0	0	0	0
	CEC	20 meq/100g				
50 (100)		300	300	300	300	300
75 (150)		300	300	300	300	300
100 (200)		300	300	300	300	300
125 (250) ²		270	300	300	300	300
145 (290)		160	190	220	250	280
165 (330)		55	65	75	85	95
175 (350)		0	0	0	0	0
	CEC	30 meq/100g				
75 (150)		300	300	300	300	300
100 (200)		300	300	300	300	300
125 (250)		300	300	300	300	300
150 (300) ²		270	300	300	300	300
170 (340)		160	190	220	250	280
190 (380)		55	65	75	85	95
200 (400)		0	0	0	0	0

¹ Values in parentheses are lb/acre.

² Maintenance recommendations are given for this soil test level

³ Potash recommendations should not exceed 300 lb per acre.

PHOSPHATE (P₂O₅)
RECOMMENDATIONS FOR ALFALFA

Soil Test	Yield Potential - tons per acre				
	5	6	7	8	9
ppm (lb/acre)	lb P ₂ O ₅ per acre				
15 (30) ¹	115	130	140	155	165
20 (40)	90	105	115	130	140
25-40 (50-80) ²	65	80	90	105	115
45 (90)	35	40	45	50	60
50 (100)	0	0	0	0	0

¹ Values in parentheses are lb/acre.

² Maintenance recommendations are given for this soil test range.

NUTRIENT SUFFICIENCY RANGES FOR ALFALFA
 (Top 6 inches sampled prior to initial flowering)

Nutrient Element	Unit	Sufficient
Nitrogen (N)	%	3.76-5.50
Phosphorus (P)	%	0.26-0.70
Potassium (K)	%	2.01-3.50
Calcium (Ca)	%	1.76-3.00
Magnesium (Mg)	%	0.31-1.00
Sulfur	%	0.31-0.50
Manganese (Mn)	ppm	31-100
Iron (Fe)	ppm	31-250
Boron (B)	ppm	31-80
Copper (Cu)	ppm	11-30
Zinc (Zn)	ppm	21-70
Molybdenum (Mo)	ppm	1.0-5.0

Sampling information on page 204