

# **Alfalfa aphids**

Southeast Nebraska  
Alfalfa & Wheat Expo

August 24, 2023

Robert Wright



# Nebraska alfalfa aphids

- Pea aphid
- Blue alfalfa aphid
- Spotted alfalfa aphid
- Cowpea aphid

# Pea aphid

- Hemiptera: Aphididae
- *Acrytosiphum pisum*
- Feeds on variety of legume crops; alfalfa, clovers, peas

# Identification

- Large (1/8" long), green aphid, long legs, antennae, cornicles and cauda
- Antennae with narrow dark bands



# Distribution

- Throughout U. S. and Canada

# Life Cycle

- Continuous reproduction in southern U. S.
- Overwinters as egg or parthenogenetic female in northern U. S.
- Winged aphids move north in spring
- Peak numbers in early spring-summer, also in fall

# Damage

- Prefers to feed on new growth but may be found throughout the plant. Prefers stems to leaves.
- Injects salivary toxin while feeding; retards growth, yield of plants, may even kill plants
- Wilting
- Sooty mold

# Economic threshold

**Table 2-3. Economic thresholds for aphids on alfalfa at varied growth stages**

Alfalfa growth stage	Cowpea aphids per		Pea aphid per		Blue aphid per		Spotted aphid per	
	sweep*	stem**	sweep	stem	sweep	stem	sweep	stem
Seedling	--	5	--	5	--	1	--	1
<10" tall	300	40	300	40	100	10	100	10
>10" tall	400	75	400	75	200	30	200	30

\*Number of aphids/sweep.

\*\*Number of aphids/stem.

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# Controls

- Cultural
  - Plant resistance
  - Early harvest
- Biological
  - Numerous generalist predators, wasp parasitoids, fungi
- Chemical
  - Variety of foliar insecticides effective

Do not treat if the ratio of lady beetles to aphids is equal to or exceeds the following:

<b>No. of lady beetles per sweep</b>	<b>No. of pea aphids per stem</b>
ON STANDING ALFALFA	
1 or more adults	5 to 10 pea aphids
3 or more larvae	40 pea aphids
ON STUBBLE	
1 or more larvae	50 pea aphids

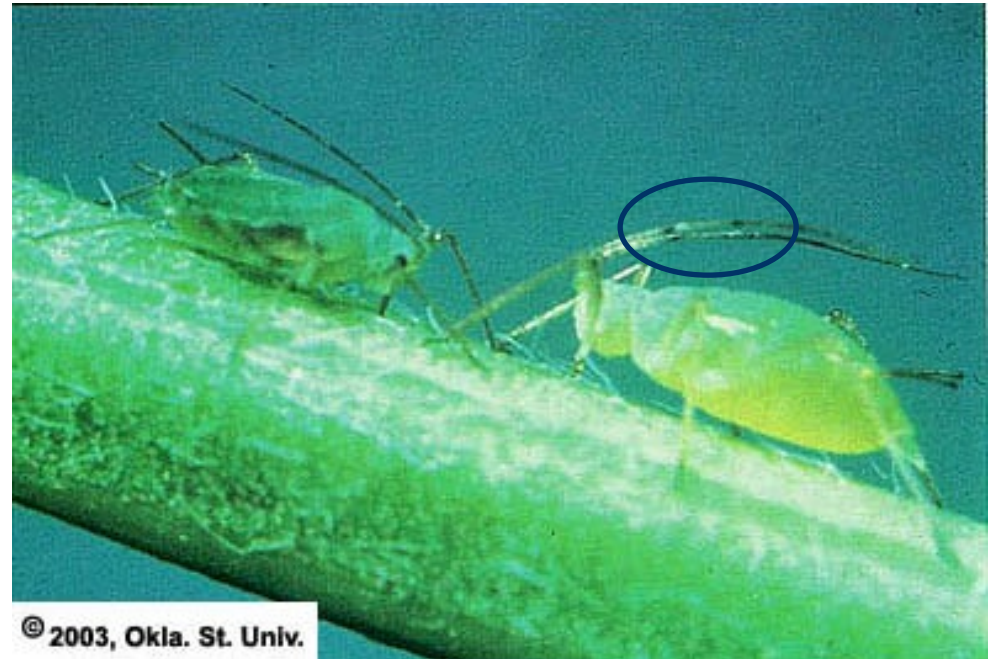
Source: University of California IPM program

# Blue alfalfa aphid

- Hemiptera: Aphididae
- *Acyrtosiphum kondooi*
- Introduced to North America; first found in California in 1975

# Identification

- Slightly smaller than pea aphid (1/10" long); otherwise very similar
- Antennae without brown bands
- Dark blue-green



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# Distribution

- Southern half of U. S., as far north as NJ, CO, NE

# Life Cycle

- Overwinters as egg in northern U. S.
- Develops early in spring; prefers cooler temperatures. Declines in mid-summer as temperatures exceed 85-90°F
- Multiple generations

# Damage

- Prefers to feed on plant terminals; prefers stems to leaves
- Inject salivary toxin while feeding; more damaging than pea aphid
- Wilting, stunting, reduced growth, death
- Sooty mold

# Economic threshold

**Table 2-3. Economic thresholds for aphids on alfalfa at varied growth stages**

Alfalfa growth stage	Cowpea aphids per		Pea aphid per		Blue aphid per		Spotted aphid per	
	sweep*	stem**	sweep	stem	sweep	stem	sweep	stem
Seedling	--	5	--	5	--	1	--	1
<10" tall	300	40	300	40	100	10	100	10
>10" tall	400	75	400	75	200	30	200	30

\*Number of aphids/sweep.

\*\*Number of aphids/stem.

Oklahoma State University



# Controls

- Cultural
  - Plant resistance
  - Early harvest
- Biological
  - Variety of generalist predators, parasitoids, diseases
- Chemical
  - Variety of effective insecticides available

# Spotted alfalfa aphid

- Hemiptera: Aphididae
- *Therioaphis maculata*
- Introduced to U. S.; first found in 1954

# Identification

- Light green, 1/16" long
- Six rows of dark spots on top and sides
- Red eyes



# Distribution

- Found throughout U. S. and southern Canada

# Life Cycle

- No sexual reproduction reported in U. S.
- Overwinters as parthenogenetic female
  - Overwinters as egg in colder climates
- Often is most abundant in hot, dry weather; mid-late summer

# Damage

- Usually feed on underside of leaves
- Inject salivary toxin while feeding, causes interveinal yellowing
- High populations cause plants to wilt, be stunted, or die
- Sooty mold from aphid honeydew



# Economic threshold

**Table 2-3. Economic thresholds for aphids on alfalfa at varied growth stages**

Alfalfa growth stage	Cowpea aphids per		Pea aphid per		Blue aphid per		Spotted aphid per	
	sweep*	stem**	sweep	stem	sweep	stem	sweep	stem
Seedling	--	5	--	5	--	1	--	1
<10" tall	300	40	300	40	100	10	100	10
>10" tall	400	75	400	75	200	30	200	30

\*Number of aphids/sweep.

\*\*Number of aphids/stem.

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# Controls

- Cultural
  - Plant resistance
  - Early cutting
- Biological
  - Variety of generalist predators, wasp parasitoids, diseases
- Chemical
  - Variety of insecticides available



# Cowpea aphid

- Hemiptera: Aphididae
- *Aphis craccivora*
- Wide host range; legumes, cotton, wild hosts include mustards, *Rumex*, *Polygonum*

# Identification

- Black, <math><1/10</math>” long
- Appendages whitish with black tips



# Distribution

- Found as a pest of alfalfa in central U. S., south to Texas, west to Arizona

# Life Cycle

- No sexual forms reported in U. S.; parthenogenic reproduction only
- Multiple generations per year
- Mid-late summer pest

# Damage

- Feeding causes yellowing of leaves, stunting of plants
- Honeydew may cause sooty mold on lower leaves

# Economic threshold

**Table 2-3. Economic thresholds for aphids on alfalfa at varied growth stages**

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Seedling	--	5	--	5	--	1	--	1
<10" tall	300	40	300	40	100	10	100	10
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\*Number of aphids/sweep.

\*\*Number of aphids/stem.

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# Controls

- Cultural
  - Early cutting
- Biological
  - Generalist predators, wasp parasitoids, disease
- Chemical
  - Variety of effective insecticides available

# Plant resistance



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NAFA's mission is to ensure the ability of all segments of the alfalfa and forage industry to compete effectively while maintaining access to global markets and meeting the requirements of those markets.

The objective of NAFA is to be a forum for consensus building among the various stakeholders and to be an effective advocate on behalf of the alfalfa and forage industry.



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# Plant resistance

	Variety	Contact for Marketing Information	Winter Survival	Bacterial Wilt	Verticillium Wilt	Fusarium Wilt	Anthracoze Race 1	Phytophthora Root Rot	Aphanomyces Race 1 Root Rot	Aphanomyces Race 2 Root Rot	Spotted Alfalfa Aphid	Pea Aphid	Blue Alfalfa Aphid	Potato Leafhopper	Stem Nematode	Southern Root Knot Nematode	Northern Root Knot Nematode	Multifoliolate Expression (H-High/M-Med/L-Low)	Continuous Grazing Tolerance (Y/Yes)	Standability Expression (R-Resistance)	Salt Tolerance (G-Germination/F-Forage)	R-RRR; X-HarvXtra; H-75-95% Hybrid	
FD 2	Foothold	BrettYoung		HR	HR	HR	HR	HR	HR	R			R		R			M			G		
	Spredor 5	Nexgrow Alfalfa	1	HR	HR	HR	HR	HR	HR	R		R										G	
FD 3 - DORMANT	54VQ52	Pioneer		HR	HR	R	HR	HR	HR	HR	R	R			HR								
	6305Q	Nexgrow Alfalfa	1	HR	HR	HR	HR	HR	HR	HR	HR				R			H					
	Graze N Hay 3.10RR	Croplan	2	HR	HR	HR	HR	HR	HR	HR		R										G	R
	Hi-Gest 360	Alforex Seeds	1	HR	HR	HR	HR	HR	HR	HR	R	MR	R		R	R	M					G	
	HVX Tundra II	Croplan	1	HR	HR	HR	HR	HR	HR	R		R			R			H				G	RX
	ISS37Q	Innvictis Seed	1	HR	HR	HR	HR	HR	HR	HR		R			R			H				G	
	LegenDairy AA	Croplan	1	HR	HR	HR	HR	HR	HR	HR	R	HR			R			H				G	
	Octane	BrettYoung		HR	HR	HR	HR	HR	HR	HR			R		HR			L					
	RR Presteez	Croplan	1	HR	HR	HR	HR	HR	HR	R	R	HR			MR			H				G	R
	Rugged	Alforex Seeds	2	HR	HR	HR	HR	HR	HR	MR		HR			MR				Y			G	
	Rugged II	Alforex Seeds		HR	HR	HR	HR	HR	HR	R	R	R	HR		R			L				G	
	Shift	BrettYoung		HR	HR	HR	HR	HR	HR	HR								H					
	SW3407	Alfalfa Partners		HR	HR	HR	HR	HR	HR	HR	R	R			R								
	WL 319HQ	W-L Alfalfas	1	HR	HR	HR	HR	HR	HR	HR		R	HR		MR			H					
	WL 336HQ.RR	W-L Alfalfas	1	HR	HR	HR	HR	HR	HR	R	R	HR			MR			H				G	R

# Biological controls



# Carabid or ground beetle



# Seven-spotted lady beetle



# Lady beetle larva



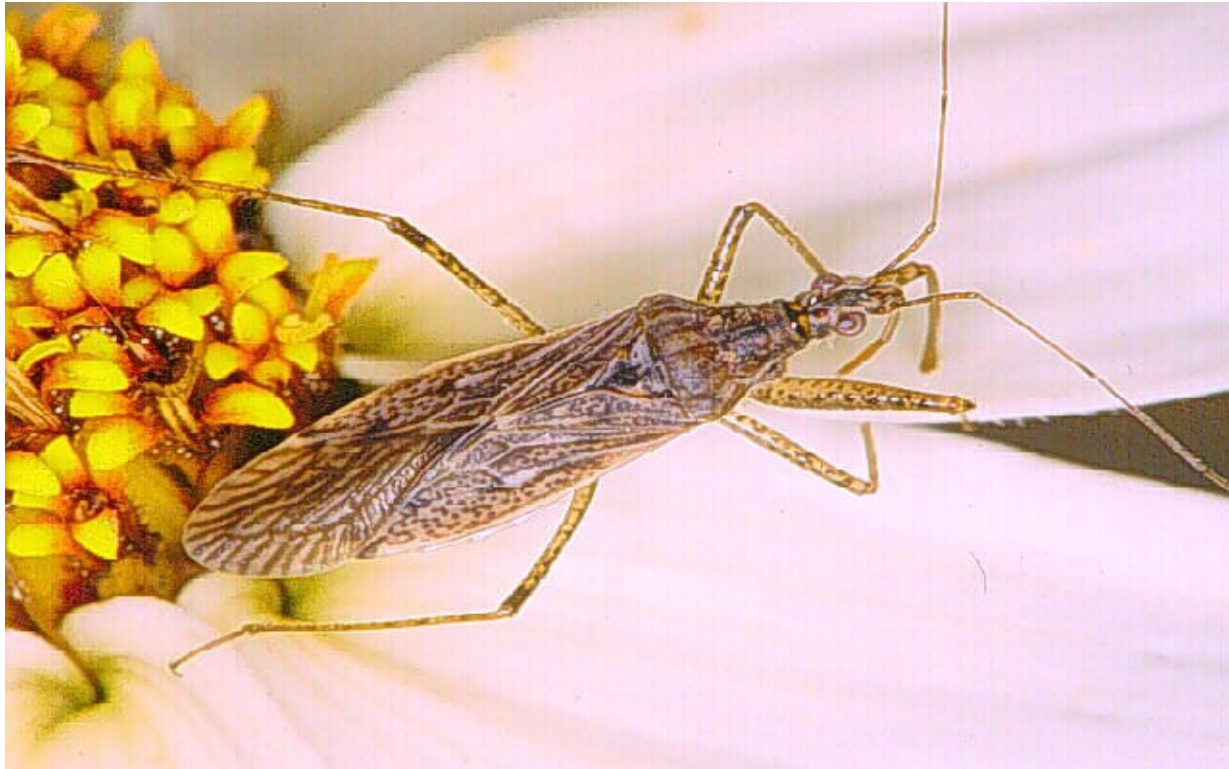
# Lady beetle pupa



# Minute pirate bug (Orius)



# Damsel bug





# Syrphid fly larva



# Syrphid fly adult



# Green lacewing eggs



# Green lacewing larva

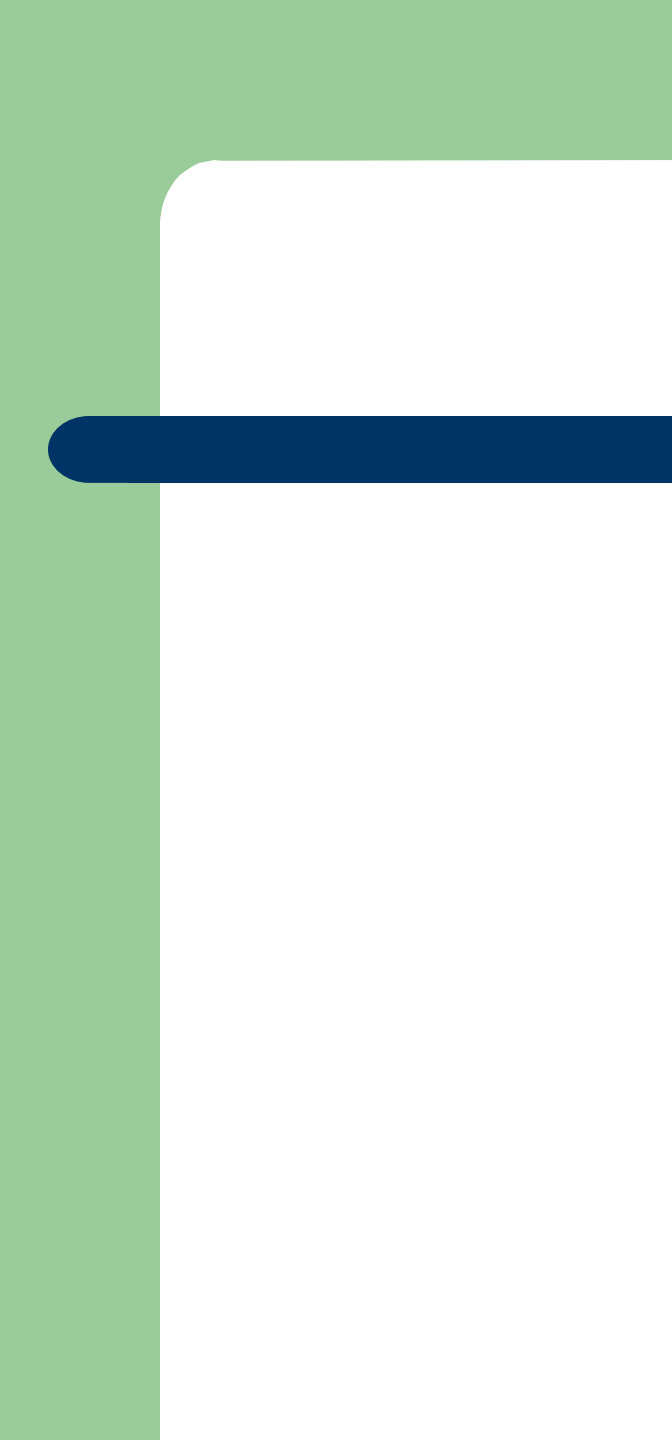


# Green lacewing adult



# Crab spider









# Potato leafhopper

- Hemiptera: Cicadellidae
- *Empoasca fabae*
- Native to North America
- Broad host range; potatoes, alfalfa, other legumes, grapes, apple

# Identification

- Adults; 3.5 mm long, wedge shaped, pale green
- Nymphs; smaller, similar in shape and color to adults

# Identification



# Distribution

- Found in eastern 1/2 of U. S.; east of 100° longitude
  - Distribution varies somewhat year-to-year because of migratory habits

# Life Cycle

- Overwinters in southern gulf coast states
- Flies north in spring
- Multiple generations in a year
- Broad host range; alfalfa, potato, dry beans, edible beans, grapes, apple

# Damage

- Nymphs and adults are sap feeding insects
- Damage symptoms include v-shaped yellowing of leaf tip, curling of leaves, severely injured tissue may die.
  - Injury referred to as 'hopperburn'
  - May also include plant stunting
  - Damage may occur suddenly due to migratory adults

# Damage



# Sampling

- Sweep net sampling





# Economic threshold

**Table I. Treatment Thresholds for Potato Leafhoppers (average number per sweep) on Alfalfa 1 to 4 inches tall.**

<i>Value of hay (per ton)</i>	<i>Cost of insecticide application (per acre)</i>					
	<i>\$8</i>	<i>\$10</i>	<i>\$12</i>	<i>\$14</i>	<i>\$16</i>	<i>\$20</i>
\$ 60	0.4	0.5	0.6	0.7	0.8	1.0
\$ 80	0.3	0.4	0.5	0.5	0.6	0.75
\$100	0.25	0.3	0.4	0.4	0.5	0.6
\$120	0.2	0.25	0.3	0.35	0.4	0.5
\$140	0.2	0.2	0.25	0.3	0.3	0.4
\$160	0.15	0.2	0.3	0.3	0.3	0.4

# Economic threshold

**Table II. Treatment Thresholds for Potato Leafhoppers (average number per sweep) on Alfalfa 4 to 8 inches tall.**

<i>Value of hay (per ton)</i>	<i>Cost of insecticide application (per acre)</i>					
	<i>\$8</i>	<i>\$10</i>	<i>\$12</i>	<i>\$14</i>	<i>\$16</i>	<i>\$20</i>
\$ 60	0.7	0.8	1.0	1.0	1.3	1.7
\$ 80	0.6	0.6	0.75	0.9	1.0	1.3
\$100	0.4	0.5	0.6	0.7	0.8	1.0
\$120	0.3	0.4	0.5	0.6	0.7	0.8
\$140	0.3	0.35	0.4	0.5	0.6	0.7
\$160	0.25	0.3	0.4	0.4	0.5	0.6

# Economic threshold

**Table III. Treatment Thresholds for Potato Leafhoppers (average number per sweep) on Alfalfa 8 to 12 inches tall.**

<i>Value of hay (per ton)</i>	<i>Cost of insecticide application (per acre)</i>					
	<i>\$8</i>	<i>\$10</i>	<i>\$12</i>	<i>\$14</i>	<i>\$16</i>	<i>\$20</i>
\$ 60	2.0	2.4	2.8	3.0	3.9	5.0
\$ 80	1.8	1.9	2.2	2.7	3.0	4.0
\$100	1.2	1.5	1.8	2.1	2.4	3.0
\$120	0.9	1.2	1.5	1.8	2.1	2.4
\$140	0.9	1.0	1.2	1.5	1.8	2.0
\$160	0.8	0.9	1.0	1.2	1.5	1.8

# Controls

- Cultural
  - Resistant hybrids
  - Harvest if alfalfa is 12" tall
    - May migrate out of adjacent alfalfa fields after cutting
  - Grass-alfalfa mixtures less preferred by PLH
  - Damaged alfalfa needs to be cut to allow regrowth
- Biological
  - Variety of generalist predators; fungal disease
- Chemical
  - Variety of insecticides effective

# PLH resistant alfalfa

- Examples:
  - Pioneer “54H69” (Leafhopper Stopper)
  - DeKalb “DK131HG” (HopperGuard)
- PLH resistance is effective in controlling leafhopper - however:
  - May need over 50% resistance
  - May need to spray during establishment
  - May need to spray when thresholds exceeded even on resistance varieties