



Integrated Pest Management of Insect Pests in Buckwheat

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Insects in Buckwheat

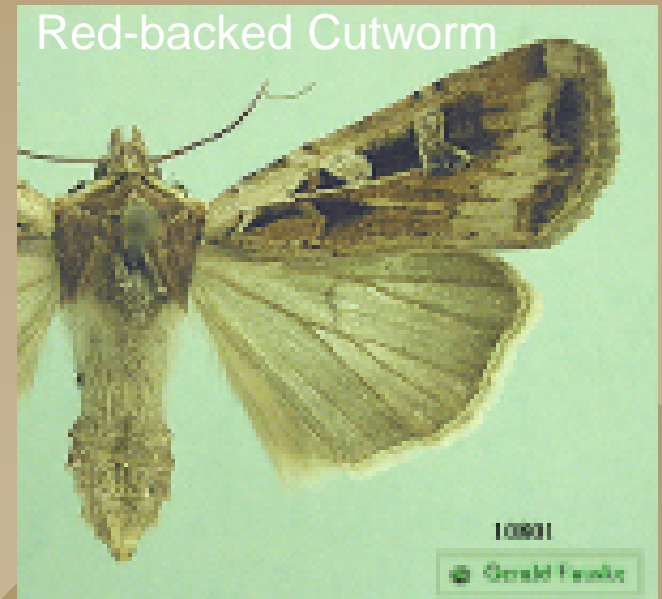
- ◆ Limited insect pests present:
 - Cutworms
 - Grasshoppers
 - Lygus bug (*Lygus* spp.)
- ◆ Habors large diversity of beneficial insects
- ◆ Good food source for pollinators (honey bee and native bees)
- ◆ In general, little research has been conducted on insect pests of buckwheat in North America, because insect related problems have been minimal.



Cutworm Identification

◆ Adult

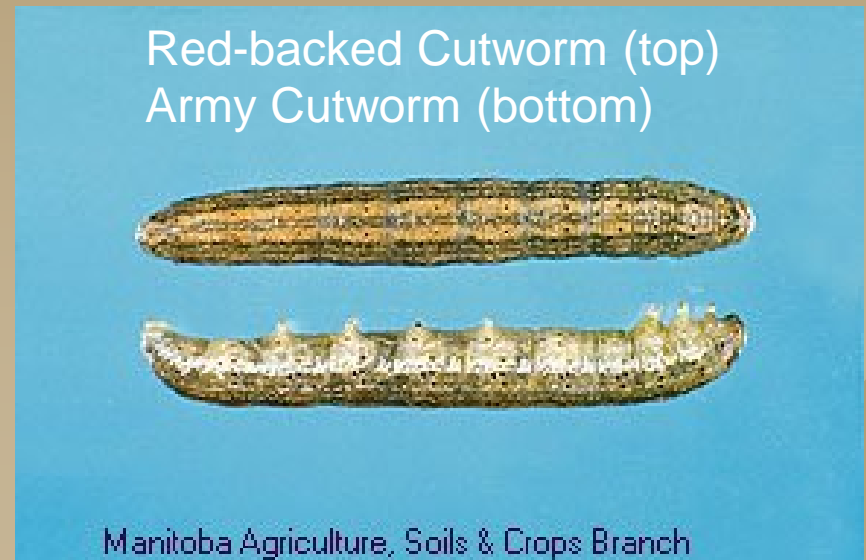
- Very robust
- Brown or black moths showing various spots or stripes in shades of gray, brown, black or white.



Cutworm Identification

◆ Larvae

- stout, smooth, soft-bodied, plump caterpillars
- Brown to tan to pink, green or gray and black



NDSU - Moth Identification Website



NORTH DAKOTA STATE UNIVERSITY FARGO, N.D.

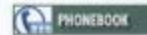
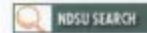


Photo Gallery

If you are unfamiliar with the major groupings of moths, it is strongly recommended that you narrow your choice to family by using the keys or moth families portions of this website, otherwise you will be potentially dealing with hundreds of names and pictures.

The photo gallery is divided into five sections. Section I is a gallery of moth images, each image is linked to an information page for that species. Section II is a gallery of larvae, again each is linked to an information page. Section III. is a roster of species information pages completed as part of *Moths of North Dakota*. Each name is a link to its information page. Section IV allows one to jump to a particular portion of the gallery, and Section V is a roster of common and Economically important moths, again with links to their particular information pages.

Moth
Images



Larvae
Images



Species
List



Images
by Family



Pest
species &
Common
moths



Euxoa auxiliaris (Grote 1873)

Common name: Army cutworm

Hodges #: 10731.

Identification: Rfw 19.1 mm, a polychromic species— see illustrations, fw narrower than most other cutworm moths (wing shape similar to 10924), antemedial line 'zig-zag' extending as far out on A_{1+2} as tip of claviform spot; hw under good light with pink reflection as in 10915; male harpe very short and rounded, sacculus extension angled upward and spatulate at apex.

Similar species: 10723, 10730, 10801.

Distribution: northern Canada to northern Mexico and from the Pacific coast to the Great Lakes region, Missouri, and Texas.

Hosts: Larvae are cutworms on a variety of crops and are economically important on varieties of wheat, oats, and barley. Natural hosts are members of the Poaceae— grasses.

Note: This species is migratory, flying into the Rockies in early summer and aestivating at high elevations, moving back on to the plains in fall for egg laying.



SD, Minnehaha Co., Sioux Falls, 20- VI- 1976, yd. lt. coll. G. Fauske.



ND, Cass Co., Fargo. 13- V- 1956, UV lt. trap.

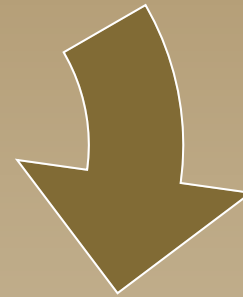
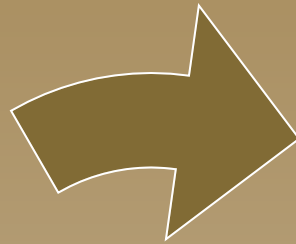


SD, Minnehaha Co., Sioux Falls, 21- VI- 1985, UV lt. trap, coll. G. Fauske.

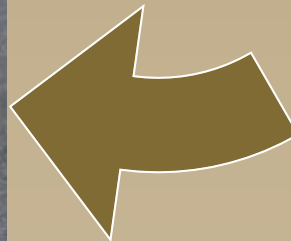
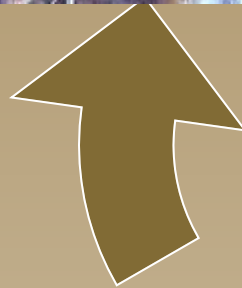


Life Cycle of Cutworm

One generation per year



Overwinter as
partial mature
larvae or eggs



Cutworm Damage

- ◆ Larvae = Chewing mouthparts
- ◆ Destroy more of plant than eat
- ◆ Injury plants in 4 major ways:
 - Solitary surface cutworms
 - ◆ Black, Bronzed, Clay-backed, Dingy cutworms
 - Climbing species
 - ◆ Variegated, spotted, W-marked cutworms
 - Subterranean species
 - ◆ Pale western and glassy cutworms
 - “Marching” in great numbers
 - ◆ Army cutworms



Field Scouting

- ◆ **Pheromone traps for adults**

- Army cutworm
- Pale Western cutworm
- Black cutworm
- Western bean cutworm

- ◆ **Field sampling for larvae**

- Trowel
- Dig under soil and freshly cut plants
- Active feeding at night



Economic Thresholds

- ◆ **Plant growth stage**
 - **Forage crops:**
 - ◆ **<4 in height = 2 or more larvae per foot row**
 - ◆ **Vigorously growing and >5 inches height = four or more larvae per foot row**

Common Grasshoppers

Red-legged grasshopper



Differential grasshopper



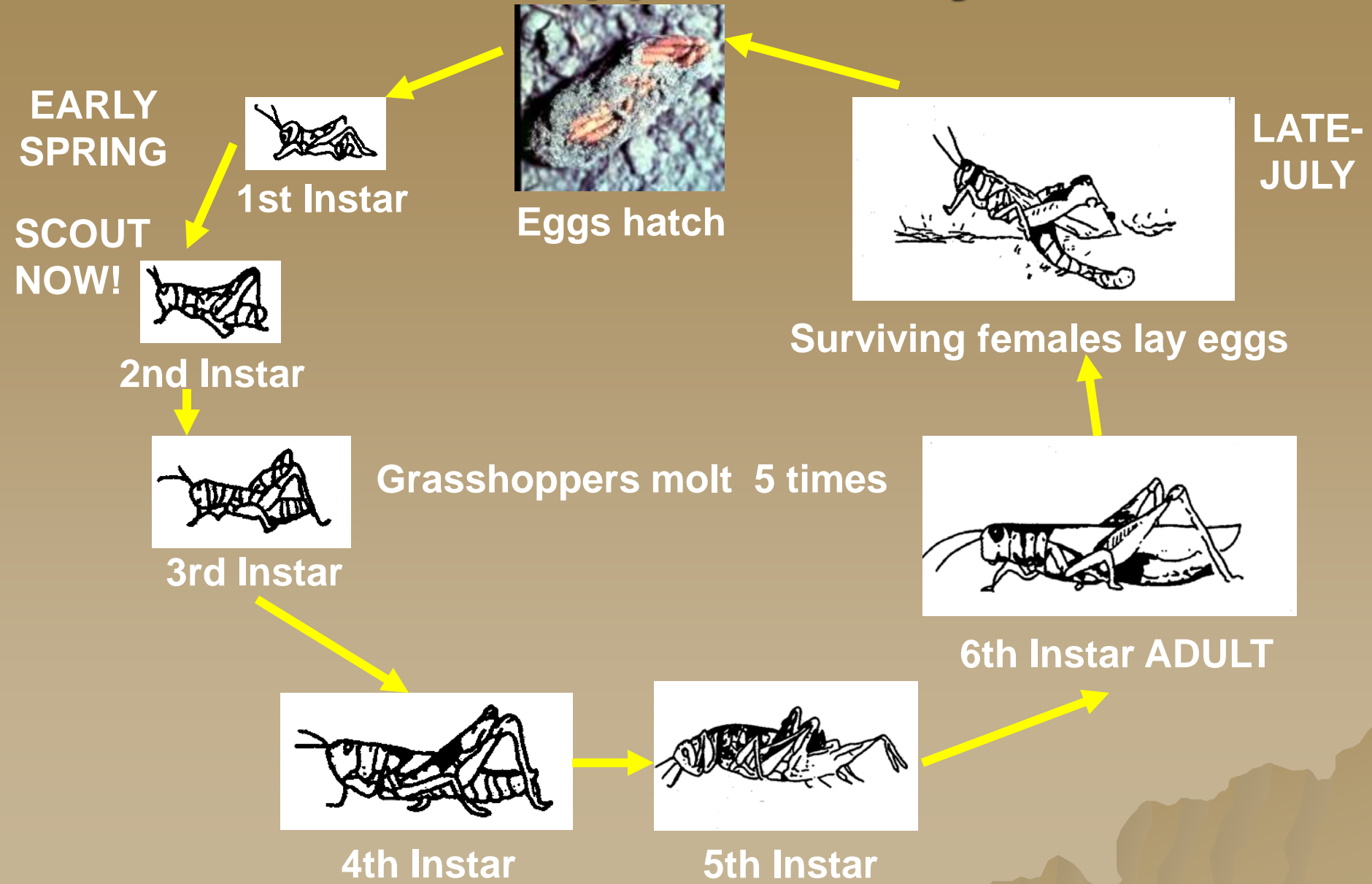
Two-striped grasshopper

Young Grasshoppers or Nymphs

- ◆ Look like adults
- ◆ Smaller than adults
- ◆ Wing pad instead of wings
- ◆ 5-6 nymphal stages or instars
- ◆ 4th or 5th instars present, hatch is winding down

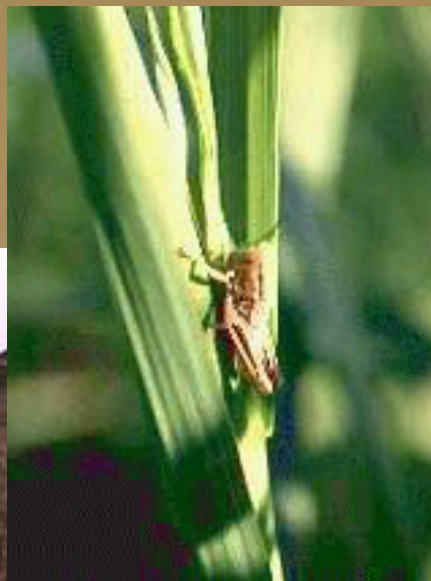


Grasshopper Life Cycle

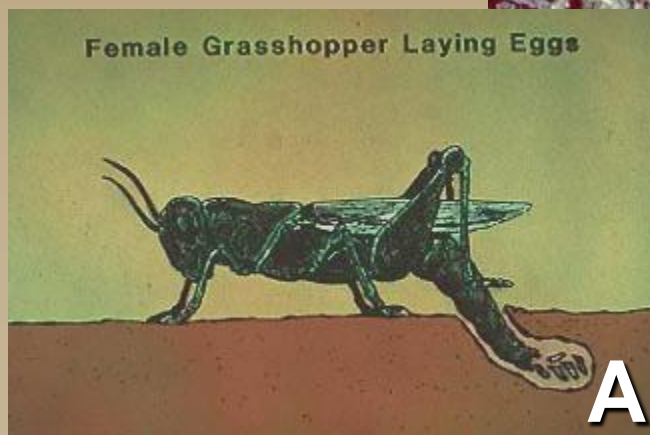




May - June



July - August



August - Sept

Grasshoppers



- Eggs are laid in the fall;
- Embryos develop while temperatures are favorable . . . There are wide ranges of development;
- This makes it difficult to predict hatch.

Lilac as an indicator:

10 days after common lilac flowered, 75% of grasshoppers were first stage

Grasshopper Egg Laying

Start in late July through fall

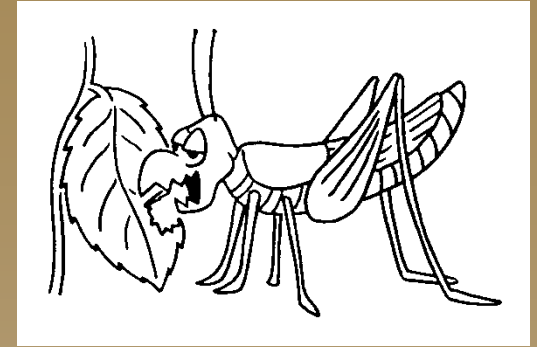
Each female = 8-25 egg masses



Each egg pod =
20-120 eggs



How Grasshopper Outbreak Develop?



- ◆ Weather dependant
 - hot, dry summers and warm falls
 - ◆ Several years of gradual increase
 - LOW YEAR = 1 GH per square yard
 - FAVORABLE YEAR = 2 GH per square yard
 - ANOTHER YEAR = 4 GH per square yard
 - ANOTHER YEAR = 8 GH per square yard
 - ONE MORE = 24+ GH per square yard
- !!OUTBREAK!!**

How Temperature Affects Grasshoppers

- ◆ High temperature in summer-fall
 - Early maturity
 - Long egg laying period
- ◆ Warm spring
 - Early hatch, followed by:
 - ◆ <70°F - No feeding, high mortality
 - ◆ Warm and dry - Good start for hoppers

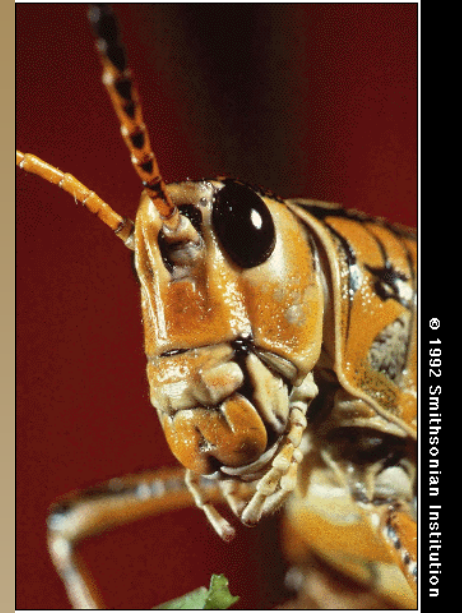


How Rainfall Affects Grasshoppers

- ◆ Cloudy, wet weather for 1+ weeks
 - Promotes fungal pathogens
- ◆ Heavy rains during emergence
 - Kills young grasshoppers
 - ◆ Embeds young in soil
 - ◆ Physically wash them away + drown
- ◆ Extreme drought
 - Poor egg hatch
 - Hoppers starve from lack of food
 - Low egg production by adults

Grasshopper Damage

- ◆ Chewing mouthparts
 - Leaf stripping
 - Head clipping



- ◆ High populations and scarce food plants
 - migrate --- "Migratory Locusts"
 - "Eat almost any plant they come upon"



Grasshopper Infestation Ratings



<u>Rating</u>	<u>Nymphs / sq. yd.</u>		<u>Adults / sq. yd.</u>
	<u>margin</u>	<u>field</u>	<u>field</u>
Light	25 - 35	15 - 25	3 - 7
Threatening	50 - 75	30 - 45	8 - 14
Severe	100 - 150	60 - 90	15 - 28
Very Severe	200+	120+	28+

Cultural Techniques

◆ Early seeding

- Established, vigorously growing plants can tolerate more damage than younger plants
- Risk of late season migration of adult grasshoppers is less
- Not option for late-seeded crops
 - ◆ sunflower
 - ◆ dry beans
 - ◆ safflower

◆ Early harvest

Crop Rotation

- ◆ Crops should not be planted in fields with severe egg infestations
- ◆ Attractive fields = late season crops
 - dry beans
 - soybeans
 - sunflower
 - flax
 - corn



Impact of Tillage

- ◆ Little value to destroy eggs directly
- ◆ Early spring tillage **before** egg hatch
 - Starve nymphs
- ◆ Late summer tillage
 - Destroys vegetation making area less attractive for feeding and egg laying



Lygus Bug (*Lygus* spp.)

- Small (1/4 inch), cryptically colored insects
- Distinctive yellow triangle or “V”
- Pale green to reddish-brown
- Immatures (nymphs) look like aphids
- Adult overwinter
- Feed on over 385 crops and weeds



Lygus Bug

- ◆ Moves from alfalfa, CRP, roadside that are being hayed or cut or other crops (canola, sunflower)
- ◆ Adults enter at bloom stage to feed and lay eggs
- ◆ Piercing-sucking mouth parts
- ◆ Older nymphs and adults suck out the contents of developing seeds and inject a toxic saliva into plant
- ◆ Hot, dry weather increases populations

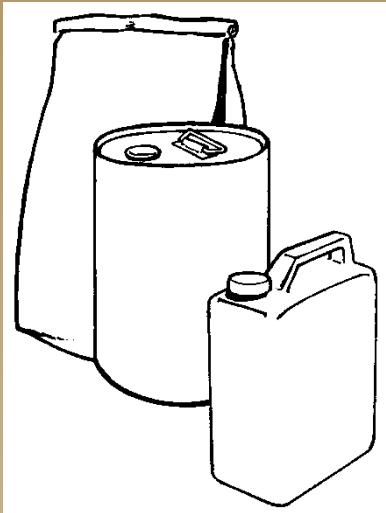


Lygus Bug Monitoring

- ◆ When to Monitor fields
 - Sweep fields during bloom-pod
 - Warm, sunny 2-6 PM
 - 5 locations in the field
 - 25 - 180 degree sweeps with the net in the canopy. (Not just the top of the canopy with net.)
 - Economic Threshold = little research data available



Buckwheat



**Always Read
Labels.**

Carbamates

Sevin

Biorational Insecticides:

Azadirachtin (Azatin XL,
Ecozin)

Spinosad (Entrust, Tracer)

Pyrethrins (Evergreen,
Pyganic)

Kaolin (Surround)

Growth Regulators

Methoprene (Extinguish)

Buckwheat

- ◆ Attractive to beneficial insects as a harbor and pollen/nectar source
- ◆ Useful as a trap crop for beneficial insects
 - Parasitoids
 - Predators





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