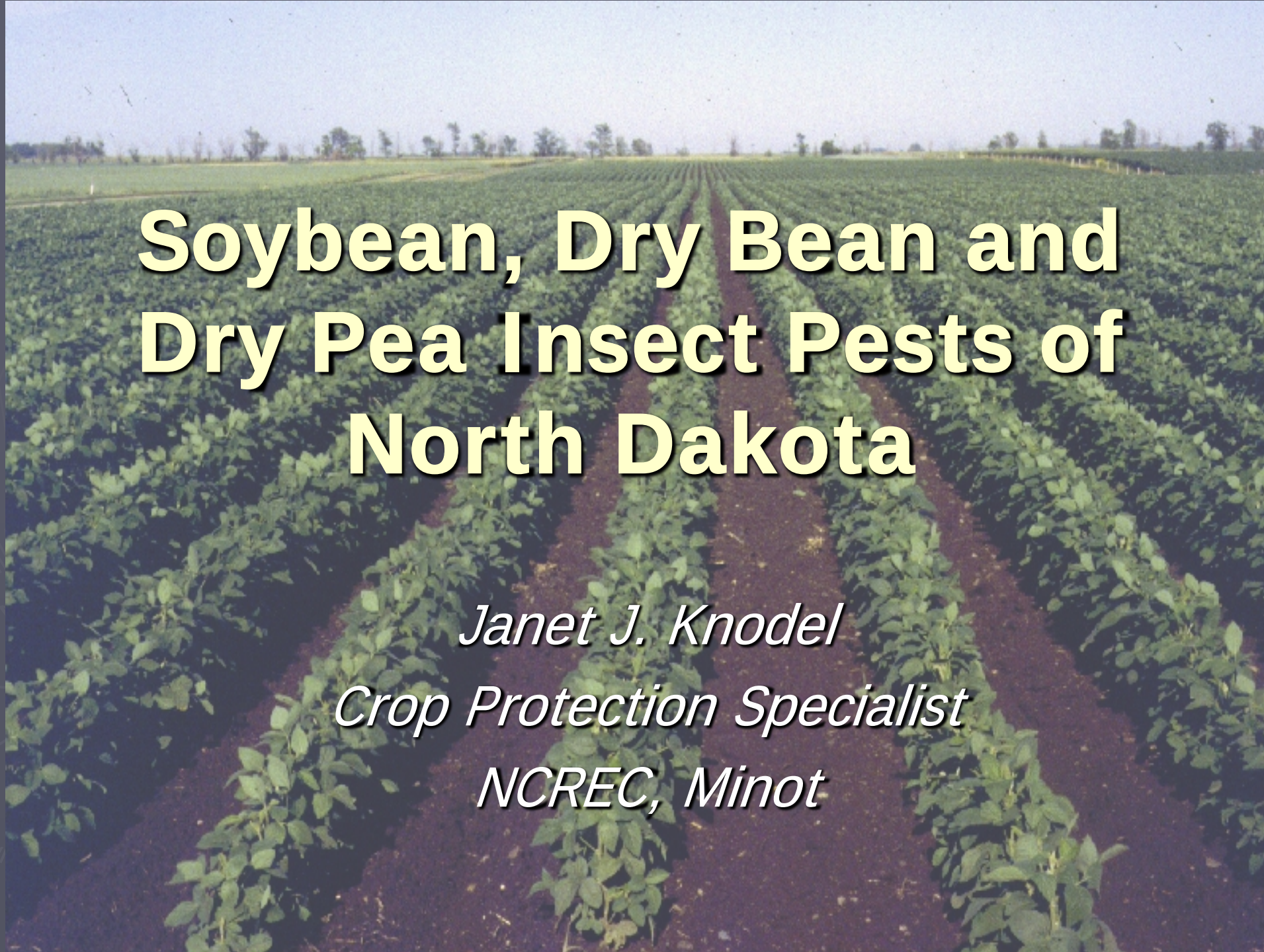
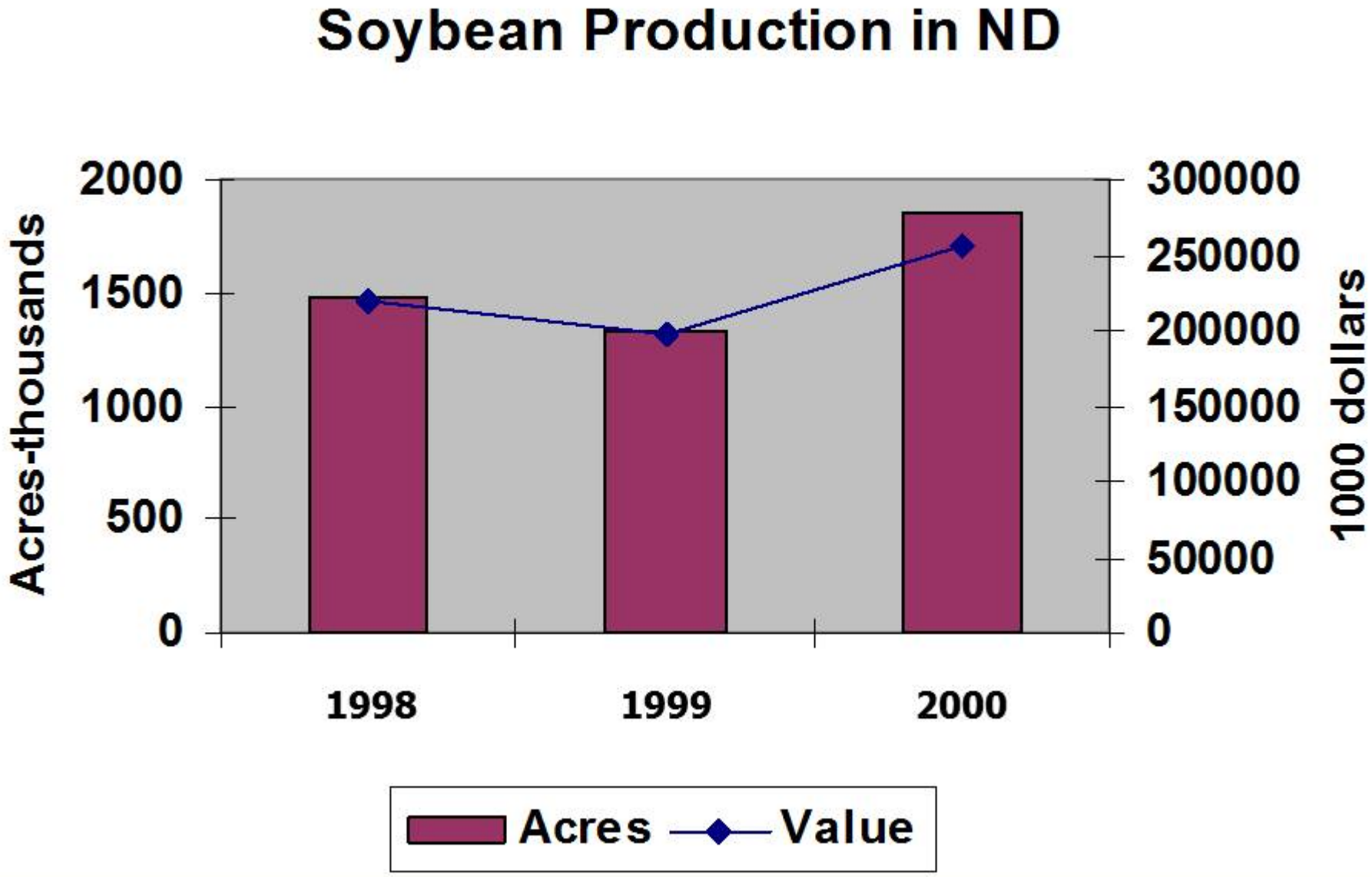


Soybean, Dry Bean and Dry Pea Insect Pests of North Dakota

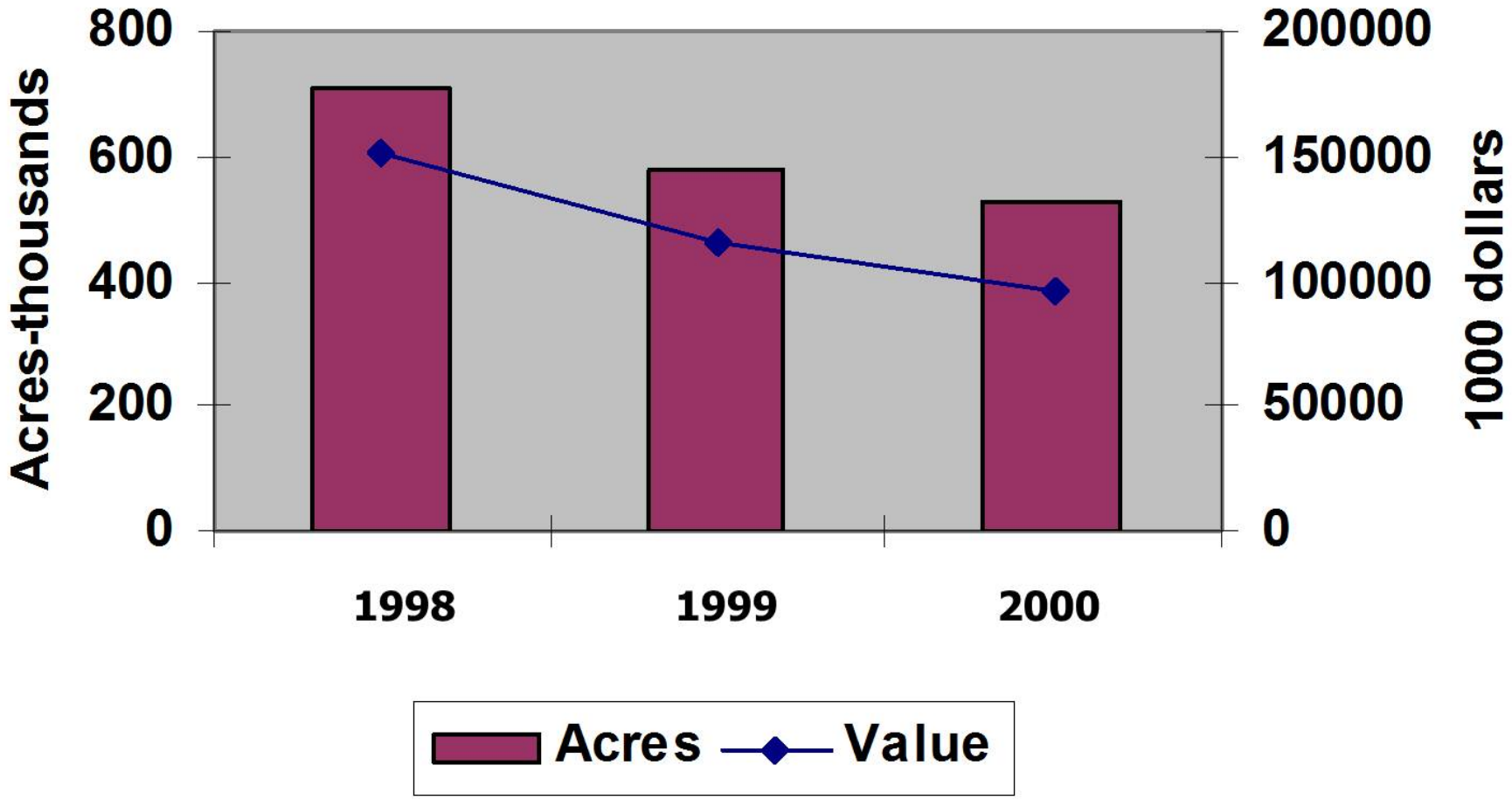
Janet J. Knodel

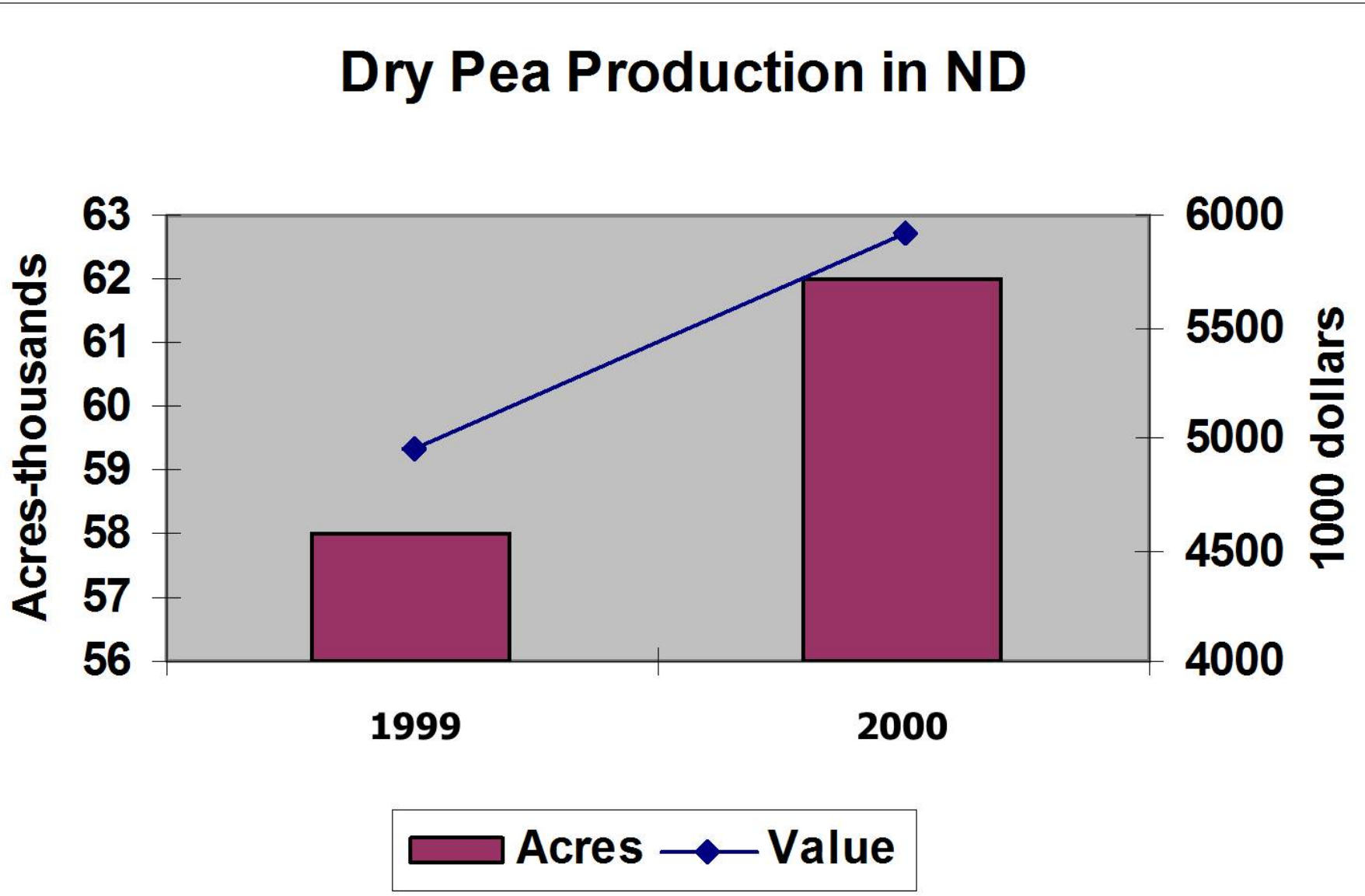
Crop Protection Specialist

NCREC, Minot


Soybean Production in ND
Acres-thousands
2000
1500
1000
500
0
300000
250000
200000
150000
100000
50000
0
1000 dollars
1998
1999
2000
Acres
Value

Dry Edible Bean Production in ND




Dry Pea Production in ND
Acres-thousands
63
62
61
60
59
58
57
56
6000
5500
5000
4500
4000
1000 dollars
1999
2000
Acres
Value

Percent of Acres Treated with Insecticides in ND

- Soybean = <1.7%
- Dry Bean = 0%
- Dry Pea = 0%
- Very little insect pest problems!

Insect Damage to Soybeans and Dry Beans

- Counts
  - # insects per foot of row
    - Beat sheets
  - Insect per plant
  - Percent defoliation (leaf loss)
  - Sweep net
- Growth stage important
  - Foliage feeding caterpillars
    - 35% defoliation at pre-bloom
    - 20% defoliation at pod-set to maturity

Cutworm Damage

- Early stage of crop development - seedling
- Feed at night
- Scouting – dig under freshly clipped plants
- Economic Thresholds
  - 1 or more cutworms per 3 feet of row and small larvae (< ¾ inch)
  - 20% of plants are cut or gaps of 1 foot

Foliage Feeding Caterpillars

- Caterpillars include:
  - Green cloverworm
  - Loopers
  - Velvetbean caterpillar
  - Thistle caterpillar
- Monitor for presence visually or use beat sheet
- Economic Threshold for all caterpillars
  - 30% defoliation prior to bloom
  - 20% defoliation after bloom to pod set

  (or 4-8 larvae per row foot)

Green Cloverworm

- Adult
  - Dark brown with lighter markings
  - Triangular wings
- Larvae
  - Slender body
  - Green color
  - 4 pairs of abdominal prolegs
  - 2 narrow lateral white strips
  - Looping behavior

Cabbage and Soybean Loopers

- Adult
  - Migrate into ND
  - Forewings with mottled brown with golden-bronze colored sheen and two silver spots
  - Hindwings dusty brown
- Larvae
  - Thick body
  - Green with light longitudinal strips
  - 3 pairs of prolegs
  - Looping behavior

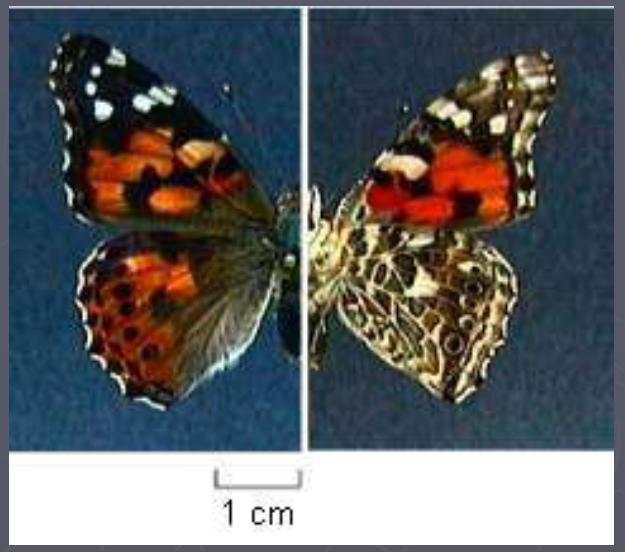
Velvetbean caterpillar moth

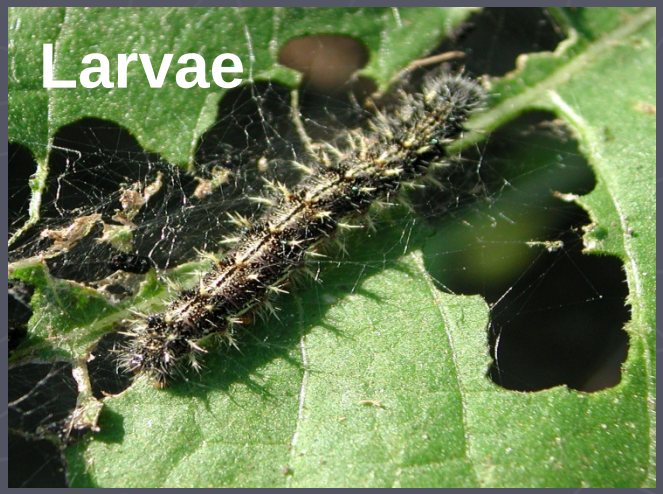
- Adult
  - Migrate into ND
  - Light brown or black with diagonal dark line running across wings
- Larvae
  - Slender body
  - Green to brown/black with dark lines borderd by lighter colored lines
  - 5 pairs of abdominal prolegs

Photo by J. Fauske

Thistle Caterpillar (or Painted lady butterfly)

- Adult
  - Migrates into ND
  - Orange-pink and black
  - 4 small black eyespots on margin of hindwing
- Larvae
  - Brown to black in color with yellow lateral strip
  - Spiny setae (called scoli)



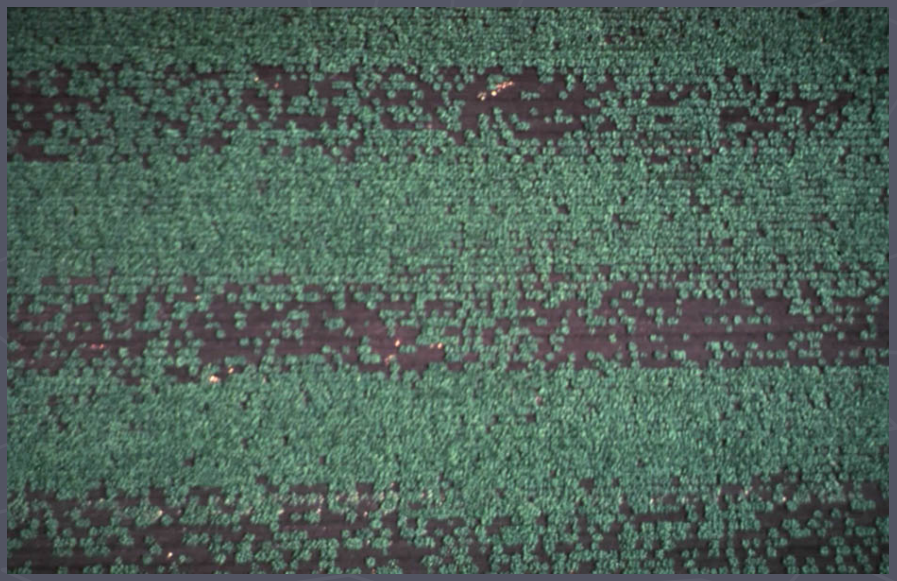


Seedcorn Maggot
Diptera: Anthomyiidae

- Adult fly
- Larvae
  - Headless, legless
  - Yellowish white maggot
- Damage
  - “Snakeheads”
  - Most severe during wet, cold springs and fields with high organic matter
- Only seed treatment

Wireworms

- Adult - “Click” Beetle
- Larvae
  - Cream to brown color
  - Sclerotized body
- Damage
  - Blank spots in field
  - More severe in fields with high organic matter
- Active when spring soil temperature are 50ºF
- Only seed treatment



Wireworm Bait Stations

Bait with grain and corn mixture
Put out in fall or spring
Cover with black plastic
Dig up 1-2 weeks later

Recommend 10-12 stations per 40 acres
Timing consuming
History of wireworms?

Armyworm

- Larvae
  - Greenish-brown with longitudinal stripes
- Adults
  - Noctuid moths
  - Migrate into ND
- Active at night

Armyworm Pest Management

- Damage often associated with grassy weed problems and large migrations from south
- NOT usually problem unless preferred host depleted (wheat, corn)
- E.T. = 25-30% defoliation or significant damage to pods

Armyworm parasitic wasp pupae

Soybean Aphid

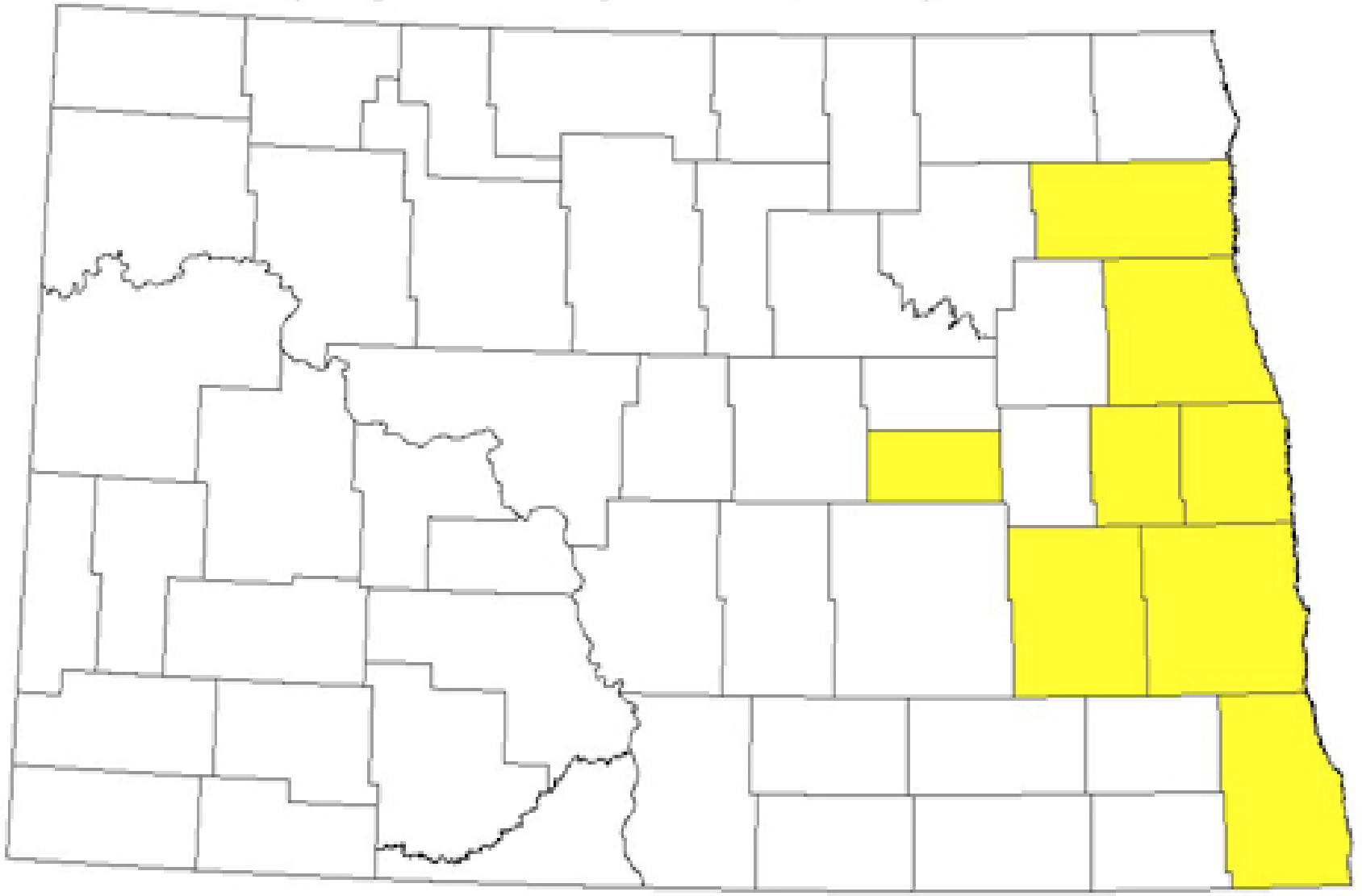
- Exotic from China and Japan in fall 2000
- Small, yellow aphid with black cornicles
- No other aphid species develops colonies on soybean in N.A.
- Overwinters as eggs on buckthorn
- After 3 generations move to soybeans and then back to buckthorn in fall

Soybean Aphid – Damage

- Stunted, yellowing plants
- Leaf distortion
- Sooty mold on leaves
- May transmit viruses that infect soybean (not documented in U.S. yet)
- Monitor fields from late seedling to blooming stage
- No E.T.
- Natural Enemies

Soybean Aphid found in North Dakota Counties

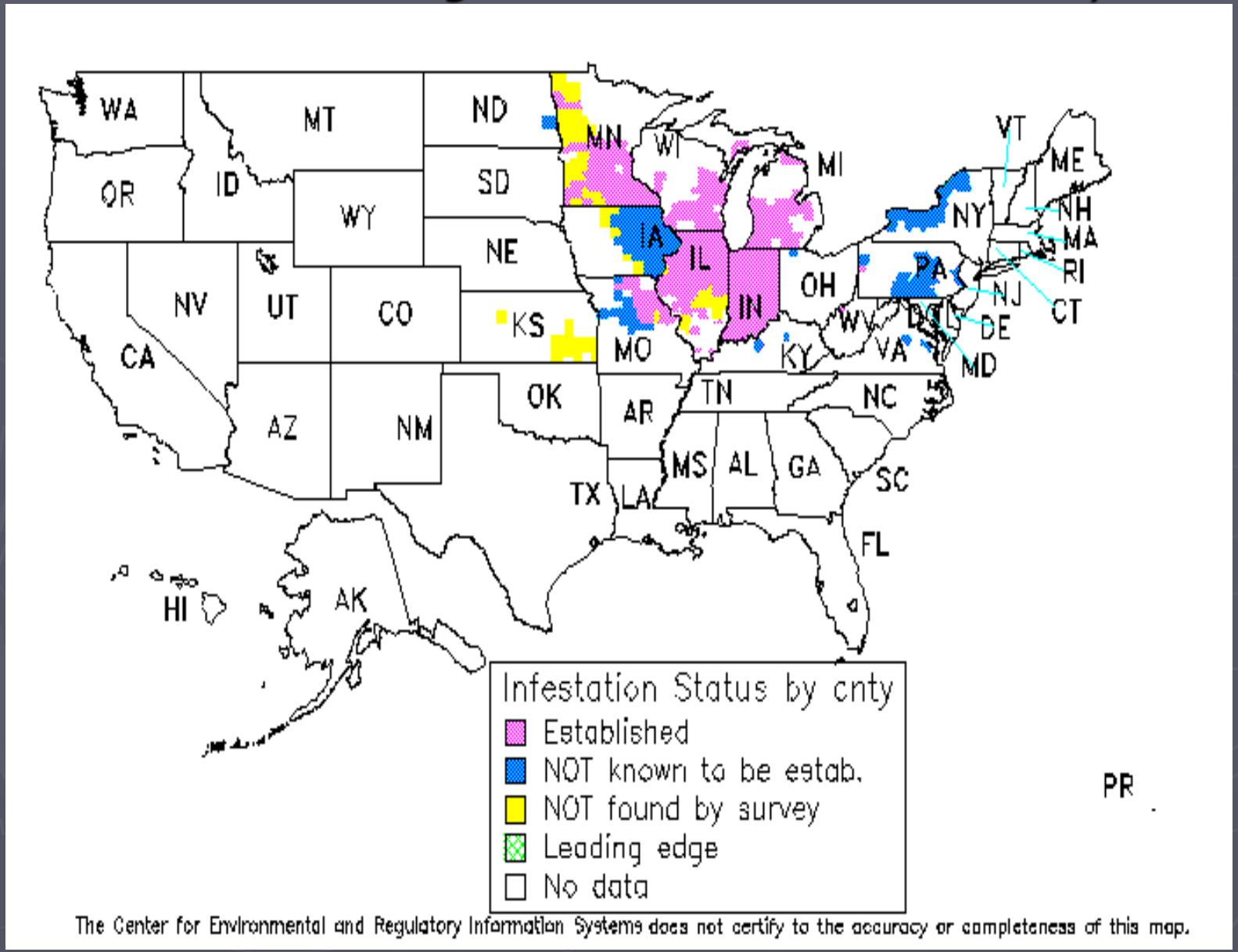
(August to September, 2001)



Soybean Aphid found in North Dakota Counties

Distribution of Soybean Aphid

Source: National Agricultural Pest Information System



Other Aphids on Dry Beans

- Piercing-sucking mouthparts
- Native and migratory species
- Feed on stems and undersides of leaves
- NOT usually a common problem in ND
- Temperatures of 72 to 80º F favor increase in population
- Biological Control

Natural Controls for Aphids

- Fungal diseases
- Epizootics outbreaks can decline aphid populations!

Ladybird Beetles - Aphid Predators

Parasitic Wasps

Lay eggs in the aphid

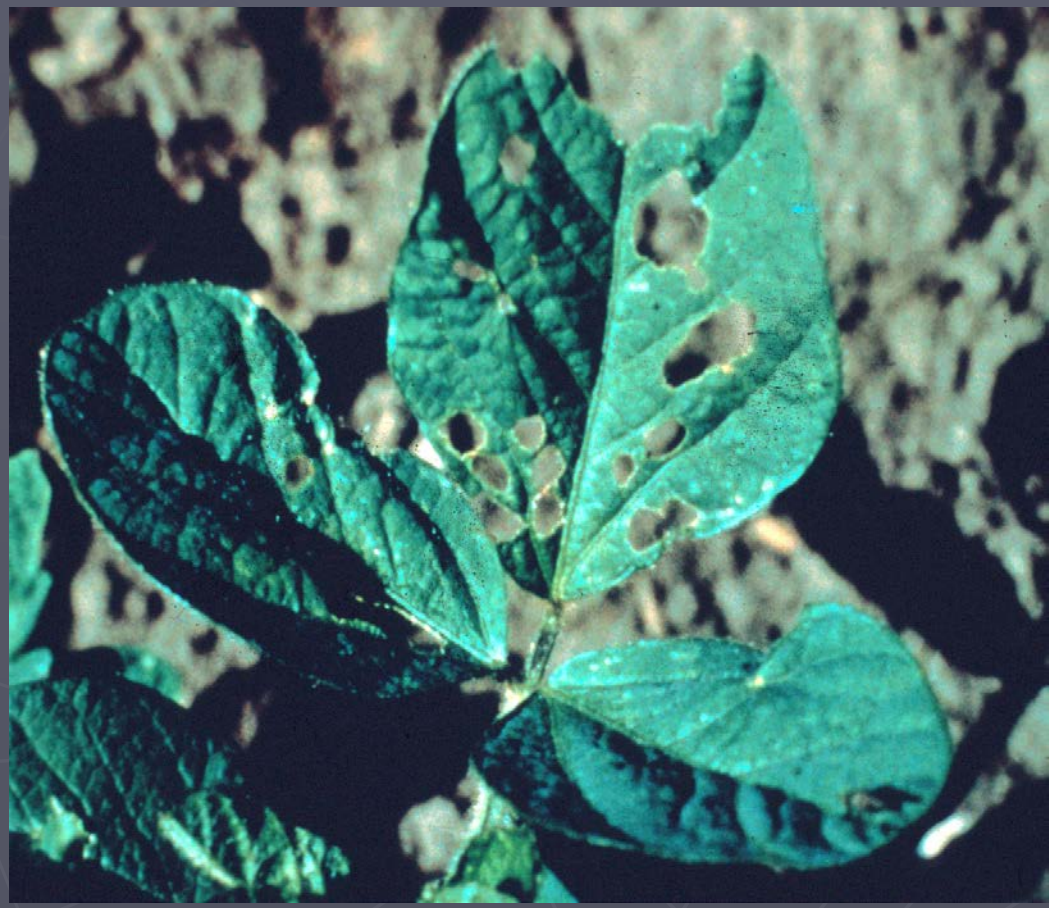
"mummy" . . .
empty shell of aphid
after parasite leaves

Bean Leaf Beetle
Coleoptera: Chrysomellidae

- Low incidence in ND
- Adults
  - Vary in color
    - Yellow phase
    - Red phase
  - 3-4 Black spots with black wing margin
- Larvae
  - Slender body
  - White with brown head and anal plate
- Overwinter as adults
- 2-3 generations per season

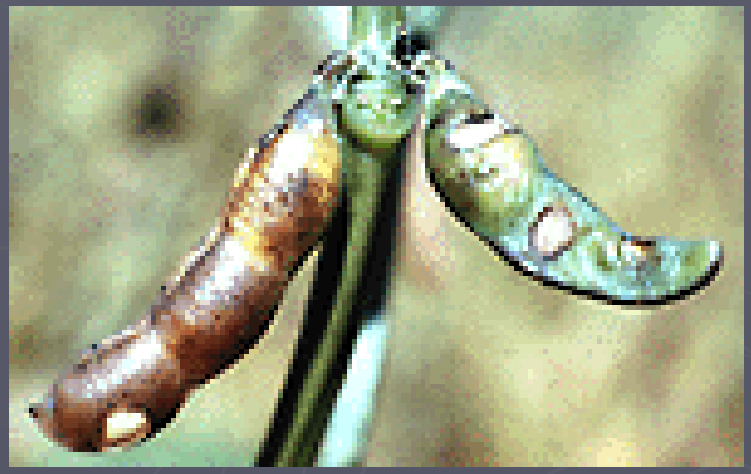
Bean Leaf Beetle Damage

- Adult
  - Chewing mouthparts
  - Foliage and pods
- Larvae
  - Develop in soil
  - Feed on roots and nodules
- Symptoms
  - Small round holes in leaves



Bean Leaf Beetle IPM

- Economic Threshold
  - Soybean – 3-7 beetles per sweep
  - Dry bean – 40-70% pod damaged (UMO)
- Cultural
  - Late planting dates (mid-May or later)
- Resistant varieties – none
- Biological Control
  - Tachinid fly



Typical pod damage:
1) decrease seed yield and reduce seed quality;
2) Secondary infection by bacteria and fungi, which cause rotting and discoloration.

Mexican Bean Beetle
Coleoptera: Coccinellidae

- Not in ND
- Adult
  - Yellow-coppery color
  - 16 spots
- Larvae
  - 6 rows of branched spines
  - Yellow color
  - Soft, grublike

Mexican Bean Beetle Damage

- Hosts – lima beans, snap beans, cowpeas
- Chewing mouthparts
- Adult and larval leaf defoliation
- Skeletonizing
- Heavy infestation may attack pods and stems

Mexican Bean Beetle IPM

- Cultural
  - Plowing under fields after harvest
- Resistant varieties of soybeans
- Physical
  - Cold winters
  - Hot, dry summers
- Biological
  - Parasitic wasps

Mexican Bean Beetles Eggs

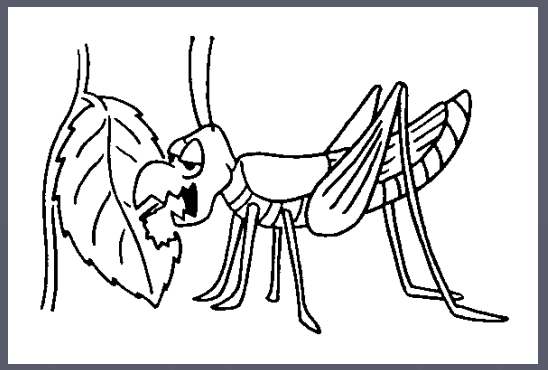
Grasshoppers

- Overwinter as eggs in soil
- Emerge as nymph in late April-May
- One generation per year
- Increase when…
  - Cool wet spring
  - Warm and dry in late spring
  - Hot summer with adequate rainfall
  - Late fall

Egg Pod

Red legged Grasshopper

Grasshopper IPM



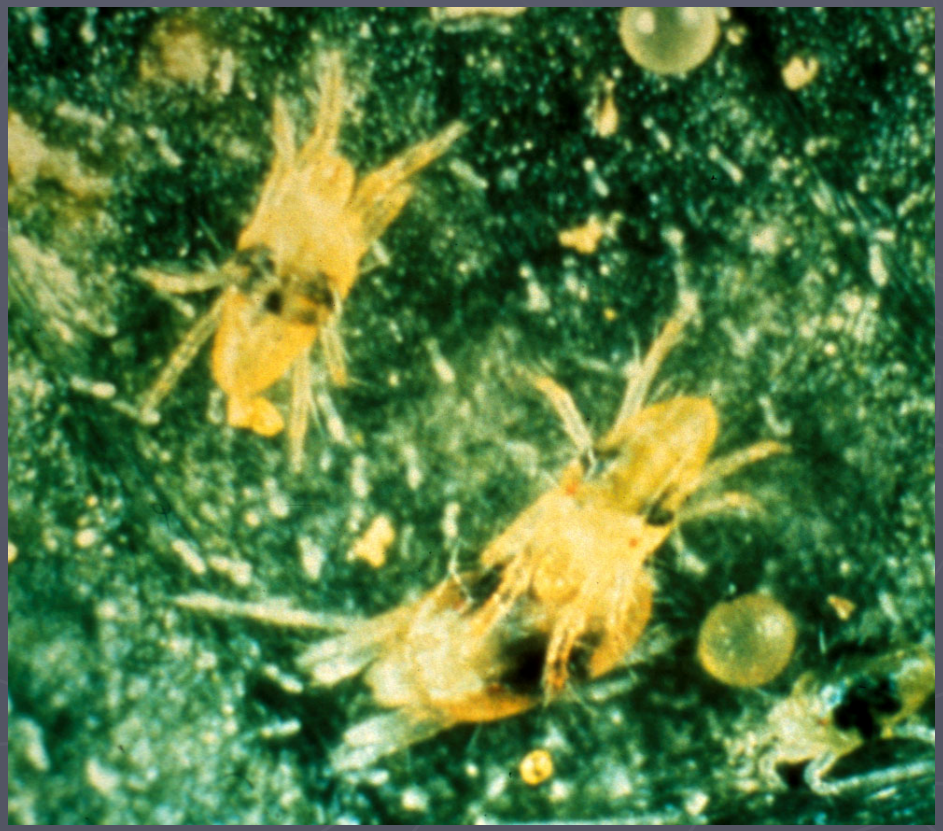
- Soybean, dry bean fields are attractive sites for egg laying in late summer - fall.
- Economic Thresholds
  - Most sensitive to defoliation during pod development
    - 20% leaf defoliation
    - 5-10% pods are injured
- Cultural control
  - Early seeded (not feasible in late planted crops)
  - Early harvest
  - Tillage – early spring or late summer

Grasshopper Infestation Ratings

	Nymphs / sq. yd.		Adults / sq. yd.
Rating	**margin**	**field**	**field**
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+

Two-spotted Spider Mite

- Adult
  - Small, magnification
  - 2 dorsal spots
  - 4 pairs of legs (Acari)
  - Sampling – white paper
- Nymphs
  - Smaller than adults
  - 3-4 pairs of legs
- Eggs
  - Spherical
  - Pale green
- Overwinter as diapausing females in sheltered areas



Spider Mite Damage

- Piercing sucking mouthparts
- Remove plant sap
- Undersides of leaves
- Symptoms
  - Early – speckled
  - Later – bronzed color
- Reduces photosynthesis ability of plant
- Problem – dry, hot weather in ND

Spider Mite IPM

- Economic Threshold
  - None in ND
  - KSU – treatment beneficial if significant pod or seed filling remain and leaves have not yellowed.
  - 50% defoliation during reproductive stage will halt flower production.
- Dispersed by wind, so can spread fast
- Cultural
  - Avoid planting next to preferred host plants (alfalfa)
- Biological
  - Predaceous mites (*Phytoseiidae*), beetles, bugs
  - Fungal diseases

Western Corn Rootworm Attracted to Soybean

- Adults
  - Light yellow to green and have three black stripes on wing coverings
  - Black markings vary
- Corn - common host plant
- New genetic variant of the No. 1 pest of corn prefers soybeans “Eastern Phenotype”
- Illinois and Indiana

Dry Pea Insect Pests

- Pea aphids
- Grasshoppers
- Cutworms
- Lygus bug

Severe pea aphids infestation (several hundred per stem) causing 50-75% yield reduction. Resembles drought stress.

Pea Aphid

- Small, light green, long-legged, reddish eye, banding on antennae
- Migrate up to ND
- Piercing-sucking mouthparts
- Vector for viral diseases
- Damage - chlorosis
- Late planted crop more attractive
- Economic Threshold
  - 10 aphids per plant

Cutworms

- Scouting – feed at night, dig down 1-2 inches
- Pea growing point below ground, so can often recover from cutworm damage if cool, moist conditions occurs.
- Economic Threshold
  - 1 or more cutworms per 3 feet of row and small larvae (< ¾ inch long)
  - 25% of plants are cut

MAJOR CROPLAND GRASSHOPPERS

TWO-STRIPED

PACKARD

MIGRATORY

DIFFERENTIAL

RED-LEGGED

CLEAR-WINGED

Lygus Bug

- Piercing-sucking mouthparts
- Prefer to feed on flowers and buds
- Inject toxin in saliva
- Abort flowers
- Damage seed
- E.T. none in ND