How Weed Biology affects Weed Management

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UMass Cranberry Station
Why do weeds always win?

Highlight some usual suspects

New weed guide

I need your help!
  ◦ Dodder survey group.
Why do weeds win?

- Rapid growth, expansion
- Efficient at uptake of water, nutrients
- Absorb resources in excess
- Can tolerate low levels of resources
Why do weeds win?

- Adaptable
- Develop resistance to control measures
- Have a lower threshold for “success” than the crop
What kind of weed?

**Annuals**
- single year/growing season

**Biennials**
- 2 years or growing seasons
  - Year 1 – growth then dormancy
  - Year 2 – flowers, seeds, dies

**Perennials**
- +2 yrs
  - Herbaceous
  - Woody (permanent above ground structures)
Seeds can be very long-lived, especially for dodder

- >17 years from our own data.
- Prolific! >16,000 seeds per plant.

- Dispersal ??

- Germination pattern ?
Elapsed Days from First Germination

Mean No. Seedlings

G<sub>50</sub> = 25 days

G<sub>90</sub> = 33 days

1st germ

2001
Study 1
Typical Timing of Herbicide Applications

Study 2 data
Dodder Management

- Delayed first and peak germination over time creates overlapping generations, making effective timing for control very difficult.

- Escapes are likely; need for postemergence options is great.
50–90% of population germinates within 30–45 days of first emergence.

Must REDUCE SEED output / deposit.

Good trash floods after harvest should remove a lot of capsules.

Flame cultivation will prevent seed production as long as seeds have not yet set.
Vegetative reproduction

- Very small parts can reproduce
  - Canada thistle: 0.25” piece of root makes a new plant!

- Perennials can be very prolific seed producers
  - Yellow nut sedge: 1,900 new plants and 18,000 new tubers in one year from one plant!
Vegetative reproduction

- Underground parts can be very difficult to reach with herbicides

- Exponential growth
  - Dewberries
Dewberry Biology and Management
A dewberry plant produces 5 daughter plants Year 1. Left unchecked, in 8 years, almost 0.5 million plants!
If nothing else ..... 

- Manage the perimeter of the infestation to minimize propagation of daughter plants
Seasonal fluctuations

- Winter: minimal activity
- Spring: export carbohydrates (CHO) from roots to new shoots

- Stored reserves DECREASE
- Moves from roots to shoots
  - maintenance, growth
Seasonal fluctuations

- **Summer**: capture & assimilate new energy
- **Fall**: “Pack it in” for winter; CHO go back down to roots

- Stored reserves INCREASE
- Moves from shoots to roots for storage
Roundup moves with the sugars in the plant.
Dewberry Nonstructural Carbohydrates

Dewberry Growth Stage

Bud Break
Full Leaf
Flower/Fruit
Mature Fruit
Dormant
April
May
June
July
November

mg of TNC

Roots

Roundup

Ghantous, PhD Dissertation 2014
Weed control – Timing matters!

Mechanical control targets aboveground
- Pulling
- Mowing
- Clipping
- Flame cultivation
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Mechanical control targets aboveground
  ◦ Pulling
  ◦ Mowing
  ◦ Clipping
  ◦ Flame cultivation
Poison Ivy on the Bog

• Same height as cranberry
• Limited control options
  • What kills PI also kills cranberry
• Suppresses yield, kills vines
Poison Ivy: Seed to Seed

- ~ 3 years
- Spreads by aerial roots and underground stems
- Very robust roots!
- Seeds dispersed by animals and water
- Food source for deer, raccoons, birds
Poison Ivy Thru Seasons

Flowers
May–July
Poverty Grass

- Warm – season perennial
- Spreads by seeds and rhizomes
- Bunch – type habit
- Late – season growth explosive
Fall Treatments (5x10 m demo plots)

- **Evital**: 80 lb/A. Knocked back existing plants but did not seem to prevent new plants in spring.

- **Poast**: Did injure PG plants (smaller, less healthy) but did not reduce seeds (new plants abundant).

- **Roundup**: Placed wand into clump center. Most did not regrow in spring; but new plants abundant, like Poast.
Other Treatments (demo)

- **Hand-weeding**: very time-consuming, but no re-growth from existing plants.

- **Devrinol (Spring or Fall, 18 lb/A)**: did not seem very effective for controlling adult plants or preventing new plant establishment.

- **Casoron (Spring, 80 lb/A)**: Seemed to affect existing plants a little; some existing growth reduced.
Other Treatments (demo)

- **Spring Evital (80 lb/A):** tougher on vines but seemed effective (more so than fall); established plants seemed less. Vine symptoms but fruit ok.

- **Pre-bloom (cranberry) Select spray by air:** Grower reported good control. Plants still small, hard to spot – treat.

- **Roundup in the Summer...**
Plant growth stage when treated with Roundup
Plant on LEFT treated with Roundup
Plant on LEFT treated with Intensity mid-July

Photos taken 8/20/14

Untreated
Plant on LEFT treated with Intensity mid-July

Photos taken at harvest  Untreated
Don’t wipe this!!

Roundup can only enter through green tissue
Seed heads were closed when “cut”

BUT... Seeds look VERY viable after mowing
Individual clumps treated 7/22/14 (10 reps)

Chart Book rates

Damage obvious within 2 wk

Plants harvested 9/12/14

Ghantous and Sandler, unpub. data
Leaf Shapes and Surfaces

linear  lanceolate  oblong  elliptical  ovate  cordate

© E.M. Armstrong 2002
Oregano

Lower leaf surface

Leaf cells with outgrowths

Potato leaf
Published by CRAAQ
• Reference Centre for Agriculture and Food of Quebec

Translating from French to English

Currently has 120 species
• Adding 24 new species

KNOW YOUR WEEDS!
Funding:
• NE-IPM Center Communications Grant
• Industry groups (ATL, BC, NJ)
• CB Research Foundation
• UMass Extension

Special Thanks to Leo Dalbec for the translation!!

Anticipated for May 2015
Herbicide efficacy

- Know how herbicides work!
- Best application window
- Health status of weed
- Mix properly
- Weather
- Hit the target!
I need your help!

- Dodder survey participants needed.
- Attend one special meeting.
- Provide feedback on the mechanics of the survey as well as info on dodder.
... which will result in ....

- Helping to define the most important factors affecting dodder and its management

- A personalized management plan for dodder on your farm!
  - Fill in small Yellow Sheet and leave at front desk.

Thank you!!
Survey for today!

- Common and tough weeds?
- Devrinol efficacy?
- Consistent low rates of Casoron for dodder?
Questions?

Thoughts of summer......