

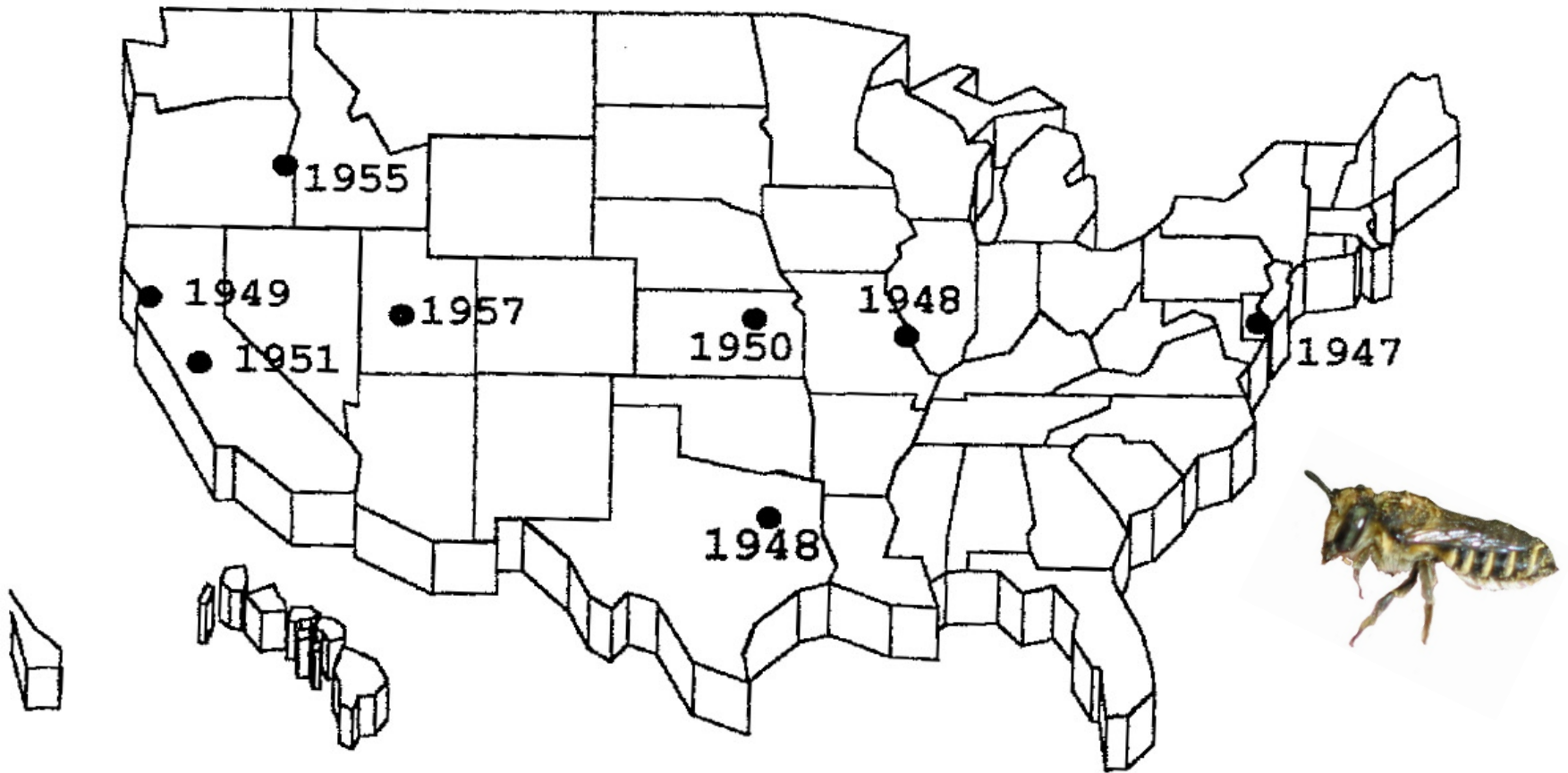
Successful Commercial Management of the Solitary, Cavity-Nesting Alfalfa Leafcutting Bee



Lessons from the Alfalfa Seed Growers

Alfalfa Leafcutting Bee

First confirmed records of *Megachile rotundata* in North America



1955 & 57: Pollinators Identified

Megachile (and *Nomia melanderi* = alkali bee)

- alfalfa seed yield greatly increased

M. rotundata "tripping" an alfalfa flower



Alfalfa leafcutter bee management in Western Canada



Agriculture
Canada

Publication 1495/E

Management and

- include natural history, timing & temperature, boards & patterns, shelter designs, details & building, fungicides, parasites & pests, etc.



Canada

K.W. Richards 1984

How to Manage the Blue Orchard Bee



Management and protocols

- includes natural history, timing & temperature, boards, shelter designs, parasitoids & pests, detailed instructions, etc.

As an Orchard Pollinator

JORDI BOSCH & WILLIAM KEMP

Bee Biology by the Seasons

Adults in Cocoons



Winter



Prepupae in Cocoons

Adult Emergence
Offspring Production
Offspring Development



Spring



Prepupae in Cocoons

Develop to Adult



Summer



Develop to Adult
Adult Emergence
Offspring Production
Offspring Development
(Summer Emergence)

Adults in Cocoons



Fall



Prepupae in Cocoons

General Management Stages:

Winter Storage

Incubation

Field Release

Prewinter Cleanup



Winter Storage

- Bee are prepupae
- Loose cells or in boards
- 4-6°C (40-43°F)



Incubation

- Project timing for 10% bloom in field
- Cells in trays; incubate at 30°C (86°F)
- Use pest strips to kill parasites (9 days)
- 17 days until males; 18-20 days until females





Adult Release

- Need shelters
- Need boards (2 holes per female)
- 45,000-60,000 bees per acre release, 2-3 batches
- Sex ratio usually 2:1 - 1:1 (M:F)



Chemical Control of Alfalfa Pests

Pre-bloom spray: broad spectrum and potent

Post-bee-release spray: “safe” and sprayed at night

Mosquito abatement accidents/incidents





Nesting Season

- Females nest for ~4-6 weeks
- Brood produced
- Some adult emergence and re-nesting



Prewinter: Harvest and Process for Wintering: Example 1 – Strip Cells

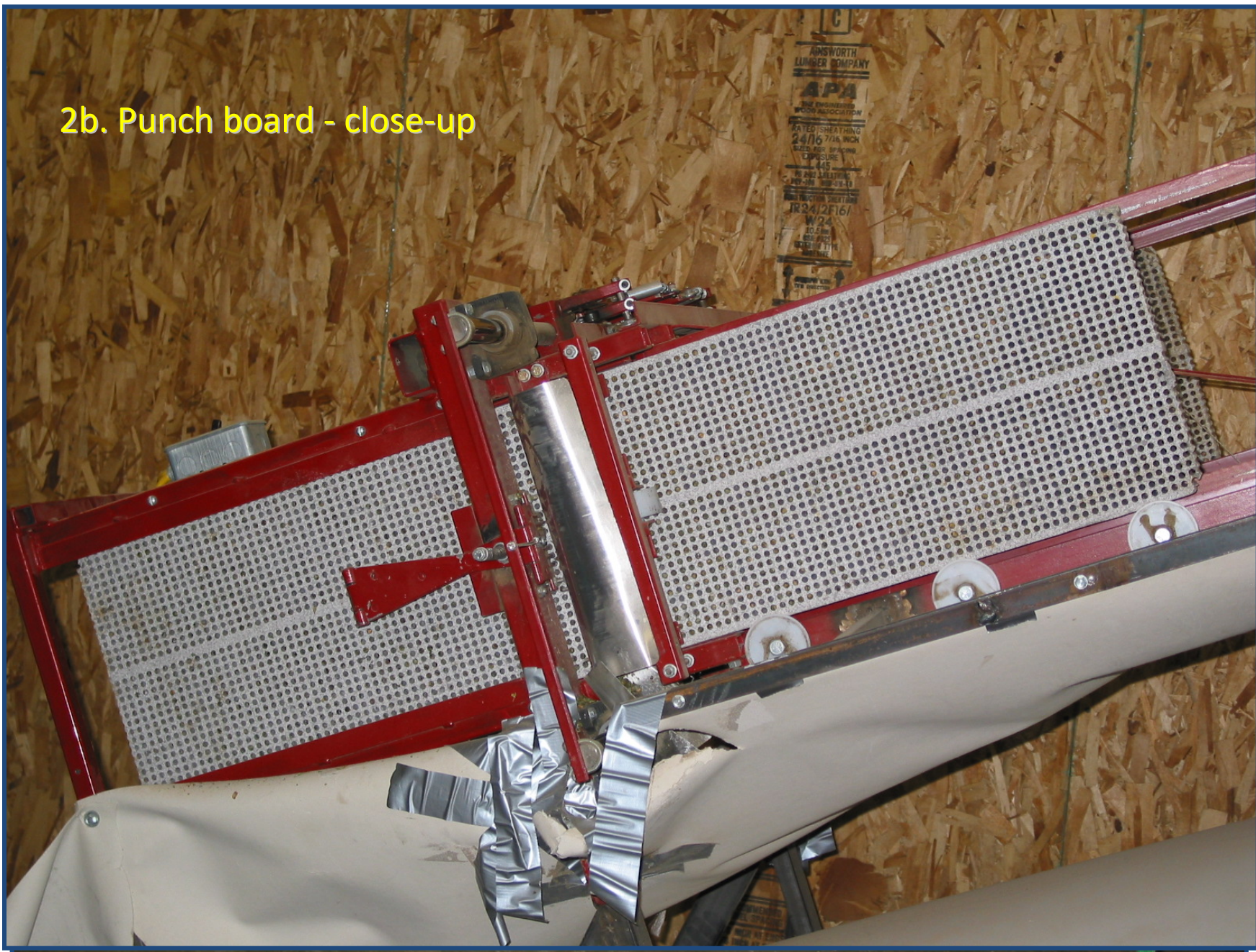


Prewinter: Harvest and Process for Wintering: Example 2 – Punch-out cells



1. Roll board

2b. Punch board - close-up





3. Cells into auger



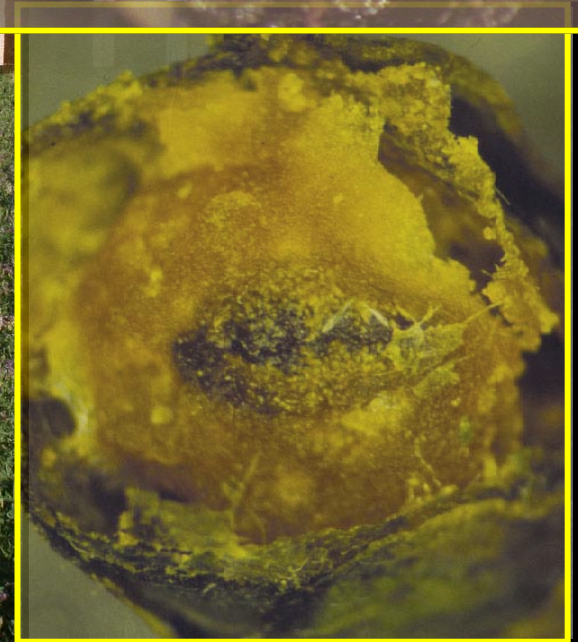
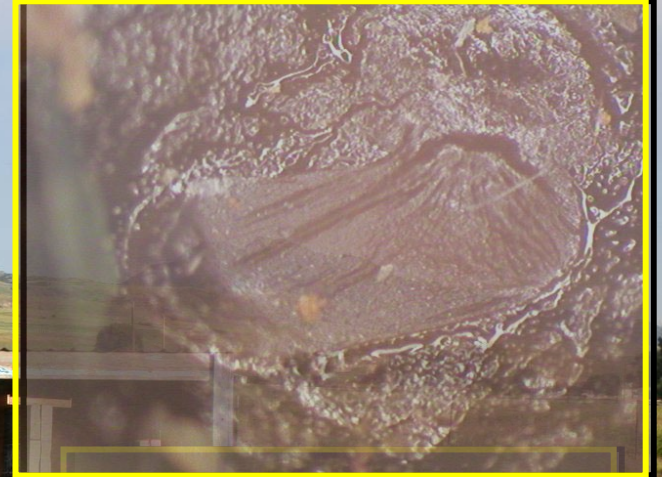
3b. Auger moves cells up through tumbler

4b. Cells stored in bucket



Research for better ALCB sustainability:

1. Determine stocking density (for bee yield)
2. Eliminate “pollen balls”
3. Reduce chalkbrood disease
4. Eliminate parasites and predators
5. Decrease summer adult emergence
6. Increase retention at commercial sites



Bee Biology & Management

Adults in cocoons



Winter storage



Prepupae in cocoons

Adult emergence for
pollination &
reproduction
Offspring development



Spring incubation



Prepupa in cocoon
Place bee cells in
trays for incubation

Continue to develop
through to adult
Get adults
into cold
storage
on time
for crop
bloom



Summer development



Incubate for adult
emergence, pollination,
& reproduction
Offspring development
to prepupa or adult

Adults in cocoons
Clean out dead &
diseased cells
Remove parasites
& pests



Fall clean-up



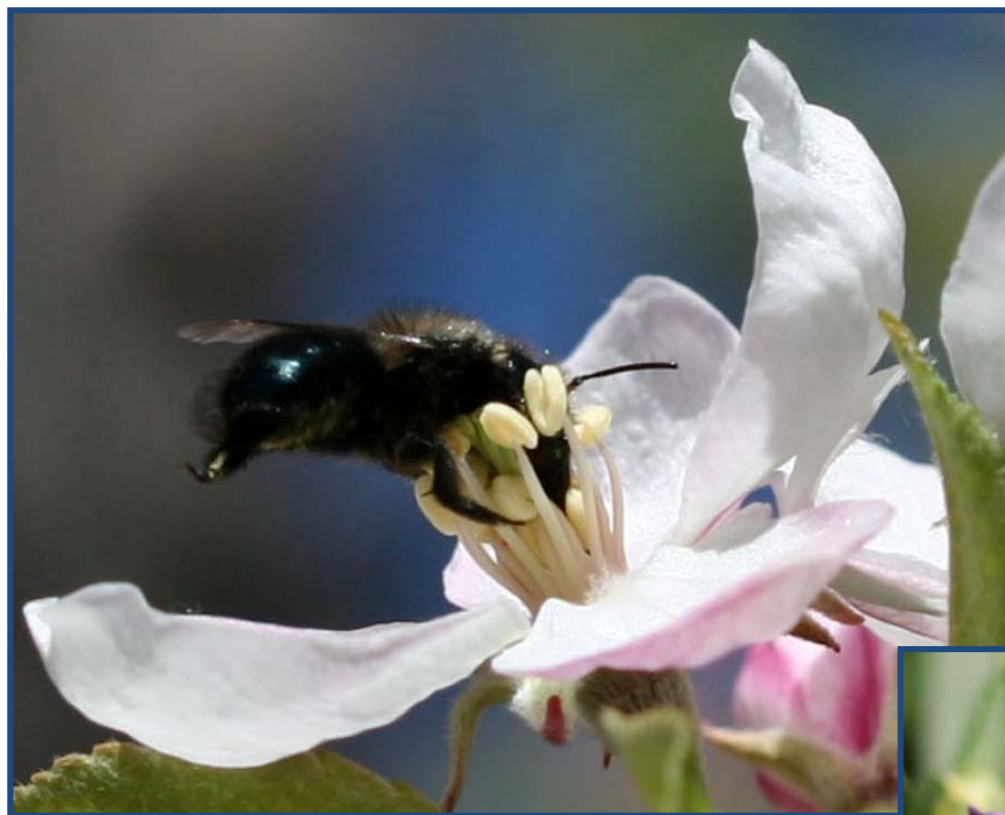
Prepupae in cocoons
Remove boards
from field
Remove cells & clean
out disease & trash

Common Challenges

- Nesting materials and shelter designs
- Equipment and know-how for storing, rearing, & releasing
- Disease and parasite control
- Pollen balls
- Dispersal/retention
- Economic & environmental feasibility
 - crop specificity

Alfalfa Leafcutting Bees Sales & Services

- Complete pollination service (Canadians)
 - Charges vary by distance from headquarters
- Bee manager + grower
 - Some work done by manager, bees kept by manager or grower, or whatever combination
- Grower-owned and managed
 - Grower does everything
 - Supplements own population with Canadian
- Growers share
 - Storage, incubators, x-ray, cleaning equipment



Blue orchard bee arrives to forage on apple blossom



Alfalfa leafcutting bee forages on alfalfa blossom; pollen explodes from flower