



SASKATCHEWAN ALFALFA
SEED PRODUCERS' ASSOCIATION

The Canadian Pollination Initiative (CANPOLIN) & Alfalfa

Opportunities for Synergism with SASPA & Canadian Alfalfa Seed Producers

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Alfalfa Seed Production



- **CANPOLIN's expertise**
 - **Pollination Problems**
 - **Pollinator Problems**
 - **Seed Problems (new technology)**

From Meeting of February, 2010

- **Action items**

#	Title	Who?	When?
1	CCA application “Status of Pollination in Canada”	CANPOLIN	June 1 ongoing
2	USDA – Logan partnering	SASPA/Industry	Now
3	Library/literature access	CANPOLIN – U of Guelph	Done
New	NSERC proposal for workshop	CANPOLIN/Industry/U Sask.	In progress

From Meeting of February, 2010

• Top priority items

#	Item	Who?	When ?
4	Dichlorvos sniffer – continuous vs indicator or bioassay: Parasitoid control, Bee safety, Worker safety	CANPOLIN	Done
5	Pollen flow/gene flow crop stock purity: Isolation distances stocking rates vs. pollen flow, Nesting capacity, phenology in crop	CANPOLIN	
6	Parasites: R&D control alternatives to dichlorvos, Including biopesticides	CANPOLIN & Partners	
7	Disease control: Chalk brood, other microflora	CANPOLIN & Partners	Ideas now
8	Alternative crop pollination	CANPOLIN & Partners	In Progress

From Meeting of February, 2010

- **2nd level Priorities**

#	Topic	Who?	When?
9	Feeding emerged bees in incubator		
10	Pollen Ball Syndrome: causes and markers		
11	Insecticide risk in field		
12	Nesting materials & disinfection: alternatives to paraformaldehyde, new nesting material.		
13	Phenology/Degree-day information: matching bee emergence to bloom		

From Meeting of February, 2010

- **3rd level Priorities**

#	Topic	Who?	When?
14	Vectoring of Biocontrol agents	CANPOLIN & Partners	Ideas now
15	Economics – price fluctuations – loss of growers/breeders a. Risk of disease/infestation from poorly kept bees b. Price /health/standards		
16	National profile of industry & organization		
17	Improved breeding methodology male:female		

Pollination Problems



- Adequate stocks to service growing industry
- Adequate stocks to service other crop
pollination requirements – Top level priority
- Matching timing of bee emergence to crop
bloom (phenology matching) – 2nd level priority

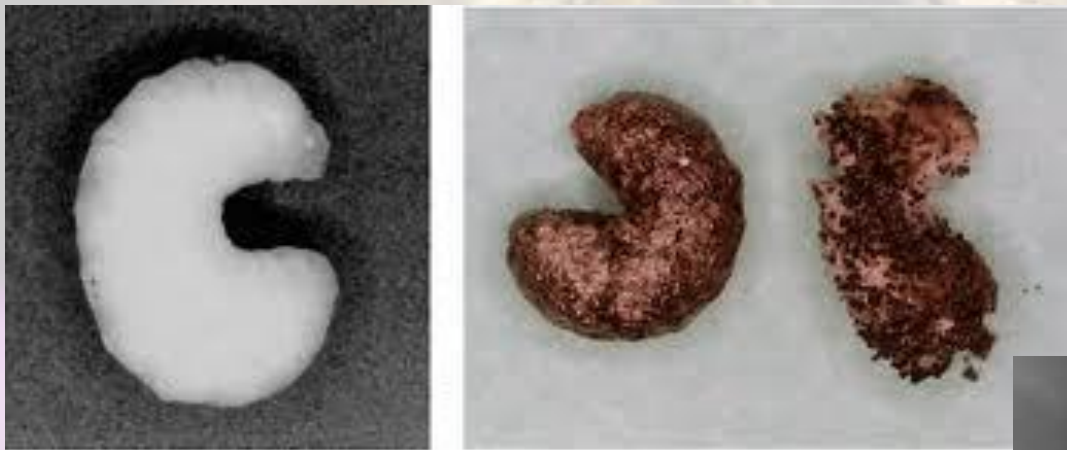
Pollinator Problems



- Diseases
- Pests/Parasitoids
- Incubation: safety for bees & people
- Deployment

ALB Diseases

- Chalk Brood (*Ascosphaera aggregata*)

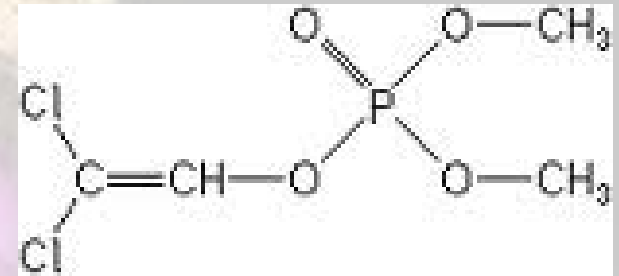


Idea: Use **fungal inhibition technology:** biological control/suppression of *A. aggregata*



ALB Pests

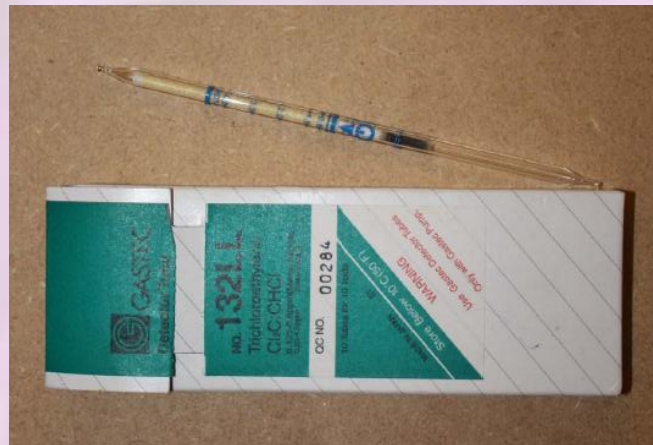
- *Monodontomerus obscurus*



Ideas: Improved trapping methods, light, pheromones, etc.

Dichlorvos Sniffer (**Top priority**): Parasitoid control, Bee safety, Worker safety

- Colorimetric test:
 - sensitive particles in glass tubes: break the tube to expose the particles; leave in incubator for 8 hours; check for colour change; if none then safe for entry
 - not sensitive enough to detect Vapona at concentrations effective for parasitoid control in ALB incubators
 - sensitive enough to indicate human safety levels



Dichlorvos Sniffer (**Top priority**): Parasitoid control, Bee safety, Worker safety

- Bioassay with adults of ALBs or Honeybees
 - place 20 living adult bees in screened cage
 - expose in incubator for 8 hours
 - if all, or almost all the bees die, parasitoids will also be killed



Dichlorvos Sniffer:

Parasitoid control, Bee safety, Worker safety

- Workplace exposure
 - Concentrations in incubators well below human health concerns by at least 1000X
 - Threshold Time Value for people = 0.9 ppm
- **Conservative Practice**
 - **Combine colorimetric test & bioassay**
 - *Colorimetric test negative – safe for people*
 - *Bioassay bees dead – flying, adult parasitoids controlled but ALBs in cells safe*

Seed Problems

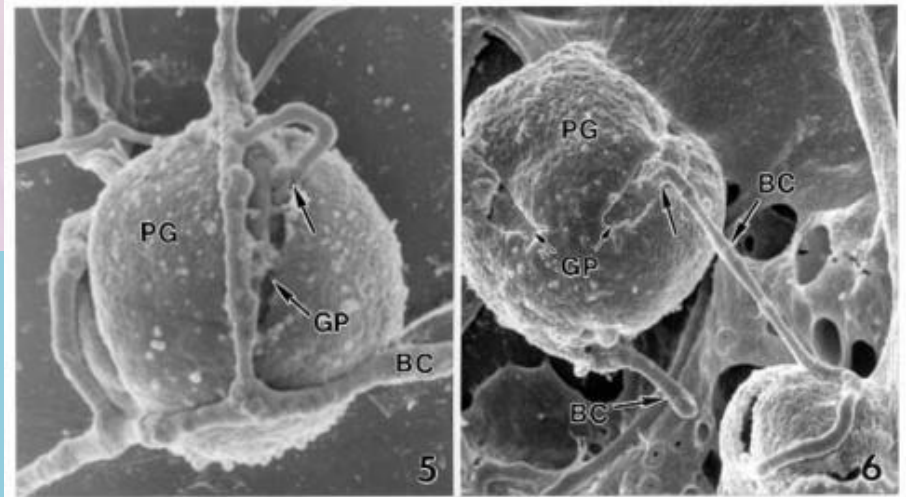
- Important disease & pest factors affecting the productivity & quality of alfalfa seed.
 - Disease on the blooms & developing seeds (e.g. *Botrytis*, *Sclerotinia*)
 - Insect pests on the blooms & developing seeds (e.g. *Lygus* bugs, Alfalfa plant bugs, Alfalfa weevils)
 - Diseases & pests reduce the bloom count, seed set, and seed size & quality.
 - Insect pests also vector disease agents
 - **IT IS VERY IMPORTANT TO PROTECT THE BLOOMS**
- Seed Health & Vigour

Fungus

- Grey mould
(*Botrytis cinerea*)



Moulded flower head and pods can result from infections carried in the air and on pollen



Fungus

- *Sclerotinia*



Plants including flower heads and pods can be infected from spores carried in the air and on insect pests damaging the pods

ALBs Damage Leaves: Alfalfa disease implication

- Pollinators can spread disease between flowers & from plant to plant through leaf-cuts
- Bees dusted with beneficial fungi reduce risk of disease spread



Insect Pests

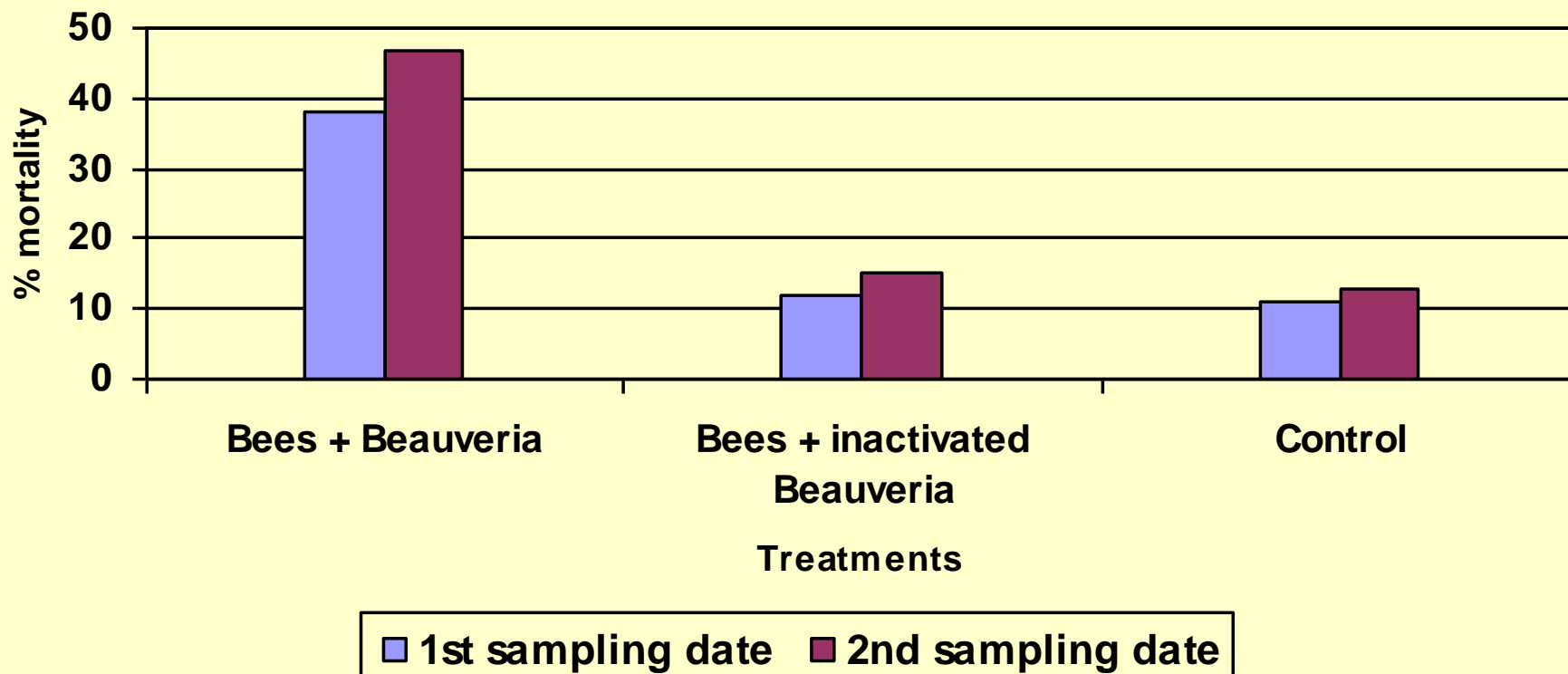
- *Lygus* bug
- Alfalfa plant bug
- Alfalfa weevil



Biocontrol Field results of *Lygus* bug mortality on canola



TPB mortality



New Tools for Promoting Alfalfa Seed Yield & Quality

- Important factors affecting the **productivity** and **quality** of alfalfa seed.
 - 1. Vigour of the seed stock (to give high % germination, fast emergence & rapid seedling growth)
 - 2. Health of the seed stock (free from disease organisms)

Beneficial fungus inoculations can really help

New Tools for Promoting Alfalfa Seed Yield & Quality: Vigour of seed stock



New Tools for Promoting Alfalfa Seed Yield & Quality

- How could the blooms be better protected?
- **An important new tool:**
- Using a beneficial fungus which controls fungus diseases on seeds, flowers etc. of crop plants
 - **Proven concept on many crops & horticultural plants**
- Using a beneficial fungi which control *insect pests*
 - **Proven concept on many crops & horticultural plants**
- **Both types of beneficials can be produced as powder formulations & applied as mixtures by familiar methods & with pollinator vectors**

Dispensing beneficials on pollinators



Idea: What would a dispenser for ALBs look like?



New Tools for Promoting Alfalfa Seed Yield & Quality

- A simple way to treat alfalfa blooms with the beneficial fungi
 - Use ALBs to deliver the powder formulation
- How the beneficial fungus works against diseases:
 - Establishes on the blooms
 - “Occupation is 9/10ths of the law”
 - Keeps flowers healthy (healthy flowers = better seed yield and quality)
- How the beneficial fungus works against insect pests:
 - Infects and kills the pest

The Canadian Pollination Initiative (CANPOLIN) & Alfalfa

- Opportunities for Synergism with SASPA & Canadian Alfalfa Seed Producers
- Application to NSERC for R & D workshop to explore details further (through U Saskatchewan) (up to \$25,000)
- Old & New R & D Priorities
- Developing new technologies
- Exploring other collaborative R & D funding sources (CAAP needs \$23K/yr to fly; NRC-IRAP)

A close-up photograph of a bee on a purple flower. The bee is positioned in the upper center, facing right, with its head and antennae clearly visible. The flower's petals are a vibrant purple, and the background is a soft, out-of-focus green. The text is overlaid on the image in a bold, black, sans-serif font.

**Thank you
for inviting NSERC-CANPOLIN
to join you here
at this exciting time
for collaborative thinking & planning!**