

Black Army Cutworm & Rhizina Root Disease



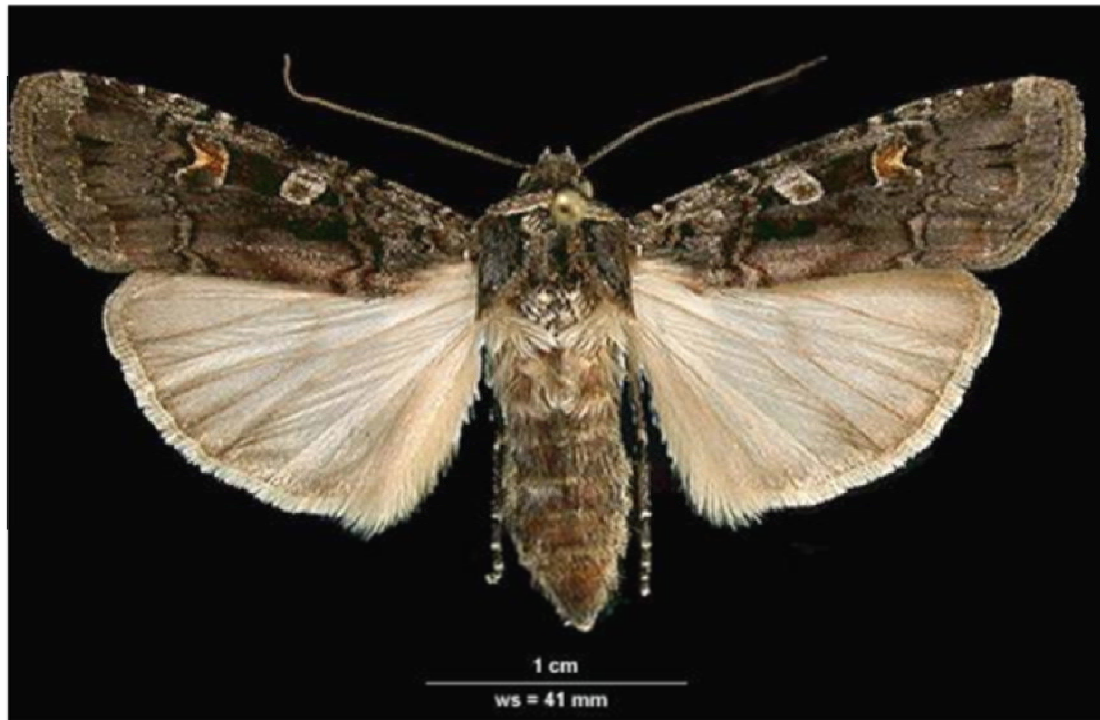
All that is Old – is new again

- Not new pests, BAC was a major pest in the 1980s
 - “consistent association of BAC with recent broadcast burning” FRDA Report 1988
 - moving away from prescribed burning for site prep has decreased impact of this pest
- Moving to increase fire on the landscape means consideration of these pests.

Where to Start?



Adult Moths



Actebia fennica (Tauscher) fem. AB Edmonton 19-vii-1996 G.G. Anweiler
U. A. Strickland Museum #UASM57290 (G.G. Anweiler image)



Key Life Stages

May	June	July	August	September	October
Caterpillars Actively feeding @ night					
	Pupa in soil				
		Moths laying eggs in soil			



Most forest pests lay their
eggs on host vegetation

Black Army Cutworm is the Kevin Costner of the insect world:

“Lay my eggs here and the food will come.....”



Key Life Stages

May	June	July	August	September	October
Caterpillars Actively feeding					
	Pupa in soil				
		Moths laying eggs in soil			
			Eggs		
				Larvae dormant in soil thru April	

Sequence of Outbreak

YEAR	May	June	July	August	Sept	Oct
N			 LATER SEASON FIRES			
N+1	 EARLY FIRES		 MOTH INVASION			
N + 2	 OUTBREAK					

Greer Fire - Vanderhoof

YEAR	May	June	July	August	Sept	Oct
2010						
2011	Plant					
2012						
2013	Plant					

- Planted spring of 2011 and seedlings were stripped.
- Additional blocks planted 2013, so far no damage has been observed (2 blocks surveyed Sept 2013).



Greer Fire: June 2010
Planted: May 2011
Photos: Robert Hodgkinson



Binta Fire, Nadina

YEAR	May	June	July	August	Sept	Oct
2010						
2011						
2012	Plant					
2013						

Spring of 2013 planted & seedlings were heavily defoliated.

– BCTS blocks heavily defoliated (ie “was this planted”?)

- 1 block will not require fill plant – trees flushed new buds
- 1 block will be completely replanted: higher elevation, earlier plant, vegetation had not emerged



**Binta Fire,
Planted Spring 2013
Photos: September 2013
Caitlin Harrison**
















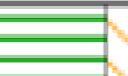



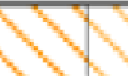




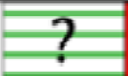

Binta Fire, August 2010

Planted May 1st 2013

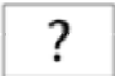

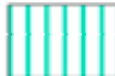



Photos: Tim Cartmell

Hazard Ratings

- Drier sites higher risk
- Sites with low levels of vegetation are higher risk

BEC Zone ^a	Drier subzones		Wetter subzones							
ESSF		 dk ^b dc1 ^{b,c,d}								
ICH		 xw ^d dw ^d								
IDF		 dm1 ^e								
MS		 dm1 ^e dk ^c								

Hazard Rating Key

Speculated hazard (limited or conflicting data)	Low hazard	Low-mod hazard	Moderate hazard	Mod-high hazard	High hazard
					

Feeding Preferences

Valerian

Western meadowrue

Common horsetail

Fireweed

False hellebore

Heart-leaved arnica

False solomon's seal

Hooker's fairybelle

Rosy twistedstalk

Honeysuckle

Western Larch

Saskatoon berry

Rose, Currants, Thimbleberries

Birch leaved spirea

Bunchberry

Soopolallie

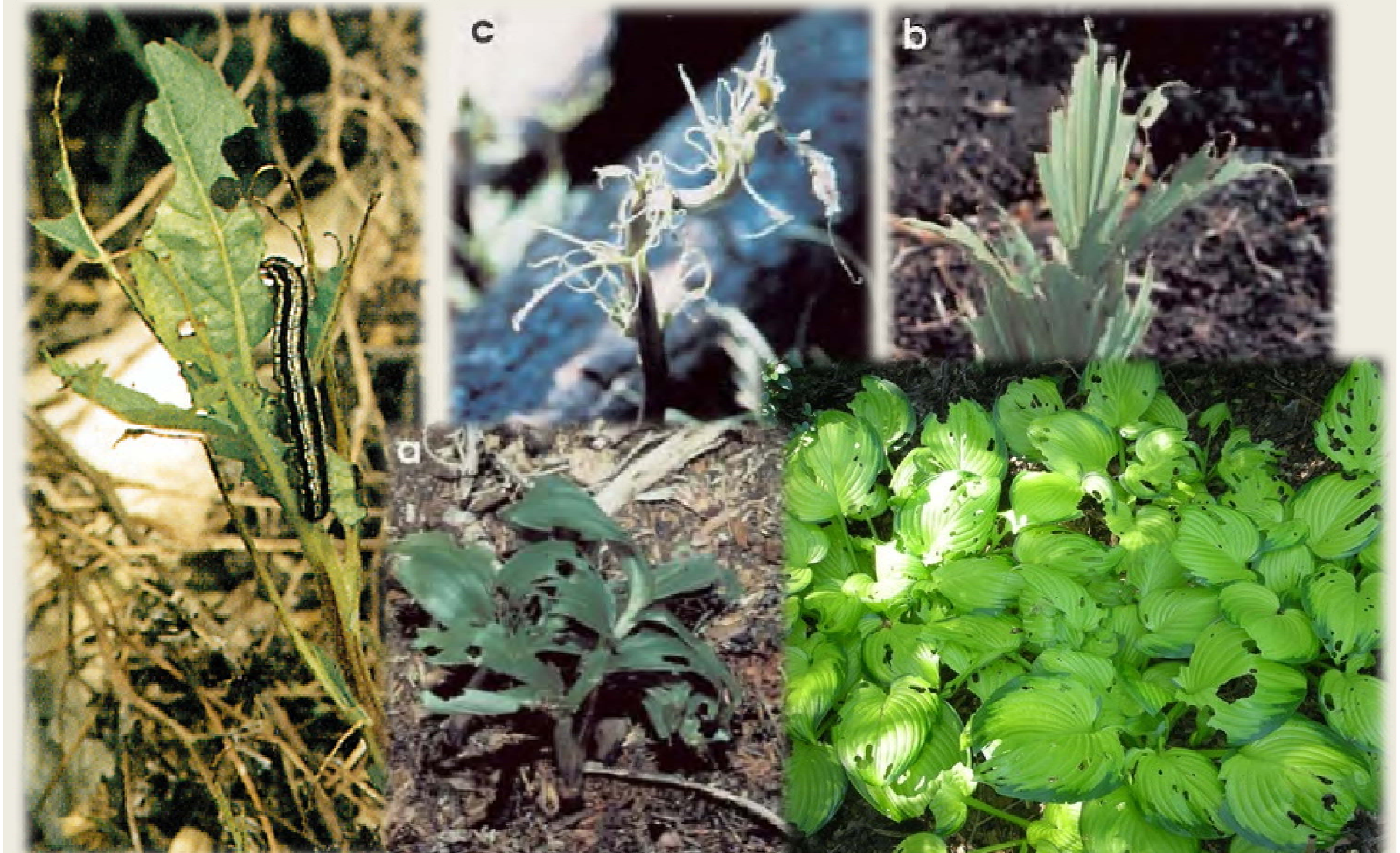
Aspen, Willow

Douglas-fir

Engelmann spruce

Lodgepole pine

Damage to Vegetation



Impacts

- Majority of mortality occurs year 1 (>90%)
- Most seedlings can sustain <60% defoliation with limited impact on growth or survival
 - >60% defoliation saw only 9% mortality due to BAC feeding alone (40-50% with poor planting/drought)
 - poor planting or drought conditions dramatically increases mortality

Impacts - >60% defoliation

- Height growth reduced in year of feeding, if terminal bud is killed, top dieback to a latent bud usually occurs.
 - Sx and Fdi are preferred, Pli and Lx suffer greater damage.
 - Newer reports: Sx was preferred, but where Pli was damaged – entire seedling was consumed
 - Lx is preferred over many succulents!

Impacts - >60% defoliation

- Severe defoliation significantly reduces root growth, increased moisture stress
 - impacts on drier sites much greater
 - poorly planted seedling will dramatic increased water stress, even on mesic sites
- On dry sites, height growth partially recovers
- On moist sites, height growth recovers quickly, approaching normal at the of the 2 year after defoliation.

Considerations

- South or west facing slopes seem to be preferred for egg-laying = first areas to see defoliation
- Severe burns = less vegetation in following year = higher risk of damage from BAC
- Early planting (before vegetation is out) increases impact

May	June	July	August	September	October
Caterpillars Actively feeding					

Tools

Pheromone Monitoring

- Early warning system the fall before planting!

May	June	July	August	September	October
			Moths laying eggs in soil		

- Place traps July 1st – Sept. 15th
 - Detailed protocols available online
- Based on results:
 - Delay planting for 1-2 years
 - Survey for larvae and damage on herbs in spring
 - Schedule summer plant to avoid larval feeding

Opportunities to Assess Risk

Monitor Blocks:
Assess larval populations

Pheromone Monitoring:
Assess risk for next spring

May	June	July	August	September	October
Caterpillars Actively feeding					
	Pupa in soil				
		Moths laying eggs in soil			
			Eggs		
				Larvae dormant in soil thru April	

Opportunities to Assess Risk

- Education is key!
 - Provide planting foremen, supervisors and planters with training to identify signs of BAC feeding on vegetation (shot-hole feeding)
- Walk the blocks in the spring – if it is warm enough to plant, it is warm enough for BAC to be active

Rhizina Root Disease

- *Rhizina undulata*, called the fire “fire fungus” because it’s spores are activated by heat .
 - Fire provides the heat to break spore dormancy but also creates a competition advantage.
- Found throughout B.C. especially on burned areas of the ICH and CWH
- Risk usually only lasts ~ 2 years following fire

Rhizina Root Disease

- Does not occur on sites where conifers were absent before fire.
- Disease occurrence is slight where sites receive a light burn, such as an early spring burn, or a severe burn where all litter and humus is removed
- The fungus occurs most often in acidic soils, less so in neutral soils and not at all in alkaline soils.

Symptoms & Signs

- Seedlings appear stressed – chlorotic needles
- Seedlings appear girdled at/below the soil line – can appear similar to beetle galleries
- Fruiting structures are very distinct, up to 6 cm in diameter, and grow within 50 cm of infected seedlings
- They are chestnut to dark brown with many brain-like lobes and fissures
- Most common in late summer and fall in wet years



Management Options

If fire was 10 - 16 months earlier: conduct survey for fruiting bodies around stumps & large woody debris

- Delay planting 1.5 – 2 years post fire
- Avoiding planting sites immediately adjacent to food bases such as stumps & large pieces wood may decrease the spread of the fungus
- Radial progression of tree mortality has been recorded to occur at 0.6 to 1 m per year. This would suggest that planting seeding closer than 1 meter will increase the likelihood of infection