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Benefits of Native Vegetation in B.C. Vineyards

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Presentation Outline:

- Overview of the BC grape and wine industry.
- Industry support for greater sustainability.
- Potential detrimental and beneficial effects of increased plant diversity.
- Research on vegetation management as part of the grape program at AAFC-PARC.
- Summary.



South Okanagan and Similkameen valleys characterized by variable soils and topography, arid conditions, intensive agriculture, rapid development, and endangered species and ecosystems.



Overview of the B.C. Grape and Wine Industry.

- ◆ Grapes first planted in Kelowna by Father Pandosy ca.1860; commercial production began in 1920's.
- ◆ Mid 1980's pull-out program as part of NAFTA.
- ◆ Rapid expansion mid 1990's; now ~ 12,000 acres, majority *Vinifera* wine grapes, ~ 120 wineries.
- ◆ Diversity in vineyard size, varieties, cultural practices, soils, climate, etc.
- ◆ Tourism-based and situated in an ecologically sensitive area.



Photo courtesy of P. Bowen, AAFC.

Semi-desert conditions of the south Okanagan favour grape production:

- Reduced incidence of fungal diseases.
- Deficit irrigation can be used to manage fruit quality.
- Fewer weed problems.



Industry Trends:

- Greater research effort.
- Less mowing, cultivation, and herbicide use.
- Fewer insecticide applications.
- Growing interest in organics and sustainable production



Industry support for greater sustainability.

- Concern for the larger environment.
- Ecological concerns of society and individual growers.
- Economic gains from reduced energy costs, ensured or improved markets, or enhanced tourist experience.
- Improved management techniques, greater awareness and government support.
- Demonstrated success elsewhere (e.g. SWNZ, 1995)



‘SWNZ provides the framework for companies to continually work towards improving all aspects of their performance in terms of environmental, social and economic sustainability in both the vineyard and the winery’.

(est. 1995)

South African growers preserve biodiversity

The Biodiversity and Wine Initiative focuses on preserving endangered species and habitats.

by Peter Mitham

A new biodiversity program is helping South Africa's wine grape growers improve vineyard management and could ultimately help them distinguish their wines on international markets.

South Africa has 9,600 native plant species adapted to thrive in the nutrient-poor soils of the Cape wine region, an area in the country's southwest that's home to 90 percent of South Africa's 250,000 acres of vineyards. Many of the species here occur nowhere else in the country, winning the area a designation as a UNESCO World Heritage Site. But a new wave of vineyard development spurred by South Africa's resurgent wine industry places many of the species and their habitats at risk.


To address the ecological challenges growers face in expanding their vineyards, a consortium of 11 organizations led by the South Africa Wine Industry Council and the Botanical Society of South Africa launched the Biodiversity and Wine Initiative www.bwi.co.za in early 2004.

An Integrated Production of Wine program www.ipw.co.za had been promoting sustainable farming practices since 1998, but the new initiative focuses entirely on the preservation of endangered species and habitats.

“Producers are really buying into this.”

—Su Birch

Good Fruit Grower
Vol. 58, No. 3
Feb. 2007.



Many growers have made a personal commitment to preserve rare and endangered plants and animals. They often work closely with environmental groups, elect to leave part of their land undeveloped, and are interested in sustainable production methods that limit chemical inputs.

BC Wine Grape Council Progress:

- Sustainable Practices Committee formed in 2008.
- Invited talks on sustainability at the 2008 BCWGC Enology and Viticulture Conference, Penticton.
- Insight Environmental Consulting (Kellie Garcia) hired to develop a Sustainable Viticulture Program.
- Program rolled out to industry at the 2009 BCWGC Enol. & Vit. Conf., Penticton.
- Draft of Sustainable Viticulture Program Guidebook (164 pgs) evaluated in the fall of 2009.
- Draft of Sustainable Viticulture Program Self Assessment manual and Sustainable Enology Program Guidebook.



Potential Problems Arising from Increased Plant Diversity :

- Competition with the vines for water and nutrients.
- Interference with operations (e.g. moving wires).
- Hosts for diseases.
- Hosts for pests.
- Not durable, or do not prevent soil erosion or aid with traction.



Potential Benefits from Increased Plant Diversity:

- Drought tolerant native plants better suited for drip irrigated vineyards (\downarrow humidity, \uparrow temperature).
- Help control the growth of overly vigorous vines.
- Provide nectar or alternative prey for beneficial insects.
- Potential trap crops.
- Contribute to greater environmental sustainability and preservation of endangered plants and animals.

Native vegetation can provide a refuge for beneficial insects.

5 hectare planting

— 250 m —

— 200 m —



Greatest distance ~100 m from edge

50 hectare planting

781 m



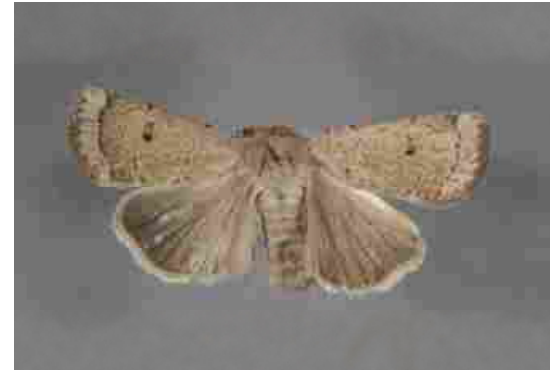
625 m

- Greatest distance ~313 m from edge
- 10 times larger area to re-colonize
- Often contiguous with other vineyards
- Sprays therefore have a greater impact on numbers of beneficials

Vegetation Management for the Control of Cutworm



Abagrotis orbis



Cutworm Larvae

(Lepidoptera: Noctuidae)

We have collected more than 18 species of climbing cutworm, mostly *Abagrotis* sp., from grapevines in spring.

Cutworm damage to the buds of grapevines in south Okanagan vineyards relative to vegetation management.

		Vine Row Vegetation			
Site	Drive Row Vegetation	Shepherd's Purse	<i>Draba</i>	2002	2003
1	clean cultivated/weedy	no	no	20	25
2	mixed, weedy	no	no	--	17
3	grass	no	no	13	--
4	grass/clover	no	no	10	6
5	grass	no	no	12	3*
6	grass/mixed	no	no	3	10
7	mixed, weedy	yes	no	3	0
8	grass	yes	yes	0	1

* Sprayed when the threshold of 3% bud damage was reached

An almost complete reduction in cutworm damage can be achieved with proper vegetation management.



Increased diversity of groundcover plants offers other benefits (e.g. increased numbers of beneficial insects) and could be used to help preserve native species of plants and animals.

Enhancing and Preserving Winter Annual Mustards.

- Sow *Draba* and shepherd's purse.
- Control weeds after shoots have elongated, when shepherd's purse has begun to set seed.
- Avoid fall weed control and persistent germination inhibitors.



These species are difficult to establish on dry, sandy soils. In the future we hope to evaluate the suitability of native winter annual mustards and other groundcover plants for the control of cutworm and other pests of grape.

Role of Plant Diversity in the Management of Leafhoppers on Grape.



Severe leafhopper feeding damage to grapevines



Virginia creeper leafhopper



Western grape leafhopper



Enhancement of *Anagrus* parasitoids*

Anagrus erythroneuræ

- Effectively controls the WGLH.
- Winters in eggs on roses, plums, apple, blackberry, etc.
- Spring and summer host includes the mint leafhopper, *Eupteryx melissæ*, on garden sage, lavender, catmint, etc.



*Lowery, D.T., S.V. Triapitsyn and G.J.R. Judd. 2007. Leafhopper host plant associations for *Anagrus* parasitoids (Hymenoptera: Mymaridae) in the Okanagan Valley, British Columbia J. Entomol. Soc. Brit. Columbia. 104:9-15.



Anagrus daanei

- Ineffective for VCLH control.
- Few winter hosts; choke cherry from Armstrong (which species of leafhopper?)
- Red osier dogwood perhaps a summer host.
- Greater numbers of parasites near riparian areas.
- For both species, proper use of insecticides will help preserve numbers.





Cumulative numbers of predacious thrips and total numbers of predators on sticky traps in 2 organic vineyards

	<u>Predatory Thrips</u>	<u>Total Predators</u>
Vineyard 'A'	4	20
Vineyard 'B'	97	144

Vineyard 'A': grass drive rows, cultivated vine rows.

Vineyard 'B': mixed vegetation in drive rows, 'weedy' vine rows, and close to native and uncultivated areas.

Future Research Involving Native Vegetation.

- As part of a large Geographic Information System (GIS) project headed by Dr. Pat Bowen (AAFC-PARC), beginning in the spring of 2010 we plan to map vegetation in and around vineyards and correlate this data with pest numbers.
- We will continue to search for alternate winter hosts for the leafhopper parasite *Anagrus daanei*.
- Native winter annual mustards will be evaluated for their suitability controlling cutworm larvae.



There is a great deal of industry interest in native plants due to their lower water demands and demonstrated benefits. As part of a move to greater sustainability, in the future we would like to see the native ecology integrated into vineyards as much as possible.

Thank You!

