



# **Geez – What’s with Genes?**

## **Understanding the Role of Genomics in Viticulture**

**Oregon State**  
UNIVERSITY

**OSU**

Patty Skinkis, PhD

April 22, 2010

# Genomics in the News



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Updated: Thursday, April 15, 2010 10:22 AM

## Scientists OK GE crops

*National Research Council assesses benefits of technology*

By MITCH LIES  
Capital Press

An independent panel of scientists has determined that genetically engineered crops benefit farmers and the environment.

According to a report released April 13 by the National Research Council, GE crops lower production costs, reduce pesticide use and improve yields. Also, the use of GE crops results in reduced soil erosion and improved water quality, the report states.

The report is the first comprehensive assessment of how genetically engineered crops affect U.S. farmers, according to the National Research Council, which funded the study. The NRC, along with the National Academy of Sciences and the National Academy of Engineering and Institute of Medicine, make up the National Academies.

The council previously released reports examining human health and environmental effects of GE crops.

Ten scientists from around the country participated in the study.

"It was a great group," said David Ervin, a Portland State University environmental and

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# Genomics in the News



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Updated: Saturday, April 10, 2010 9:09 AM

## A peach of a genetic puzzle

*Newly mapped genetic sequence to help scientists develop desirable tree fruit traits*

By [DAN WHEAT](#)  
Capital Press

PULLMAN, Wash. — After a decade of work, an international team of scientists has released the peach genome sequence, the first genome completed for crops in the Rosaceae family of some 3,000 species of plants that includes tree fruits and berries.

The information, released April 1, will be useful in the breeding of peaches and other tree fruits for traits desired by consumers, said Brian Clark, public relations and communications coordinator for the Washington State University College of Agriculture, Human and Natural Resource Sciences.

A genome sequence is all the genetic information about an organism, in this case, "what makes a peach a peach," Clark said.

It's a "haystack" of information and Dorrie Main, an associate professor of bioinformatics at

WSU, has been involved in finding the relevant bits of information on needles within the haystack.

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### Bringing Better Grapes a Step Closer to Reality

*ScienceDaily* (Apr. 13, 2010) — Grapes are one of the world's most economically important fruit crops, but the woody perennial takes three years to go from seed to fruit, and that makes traditional breeding expensive and time-consuming.

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- [Seedless Fruit](#)
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A team of Agricultural Research Service (ARS) researchers has found a way to speed things up by developing a way to identify genetic markers in the grapevine's genome that can be linked with specific traits, such as fruit quality, environmental adaptation, and disease and pest resistance.

Computational biologist Doreen Ware, geneticists Edward Buckler and Charles Simon, and research leader Gan-Yuan Zhong have developed a relatively fast and inexpensive way to identify genetic markers not only in grapes, but also in other crops by using modern sequencing approaches. Ware and Buckler work at the ARS Robert W. Holley Center for Agriculture and

Health in Ithaca, N.Y.; Simon works at the ARS Plant Genetic Resources Unit at Geneva, N.Y., and Zhong is at the ARS Grape Genetics Research Unit, also at Geneva.

The researchers used the technology to sequence representative portions of the genomes from 10 cultivated grape varieties, six wild varieties and the clone of Pinot Noir originally sequenced by scientists in 2007. They developed filters that allowed them to make corrections for common sequencing



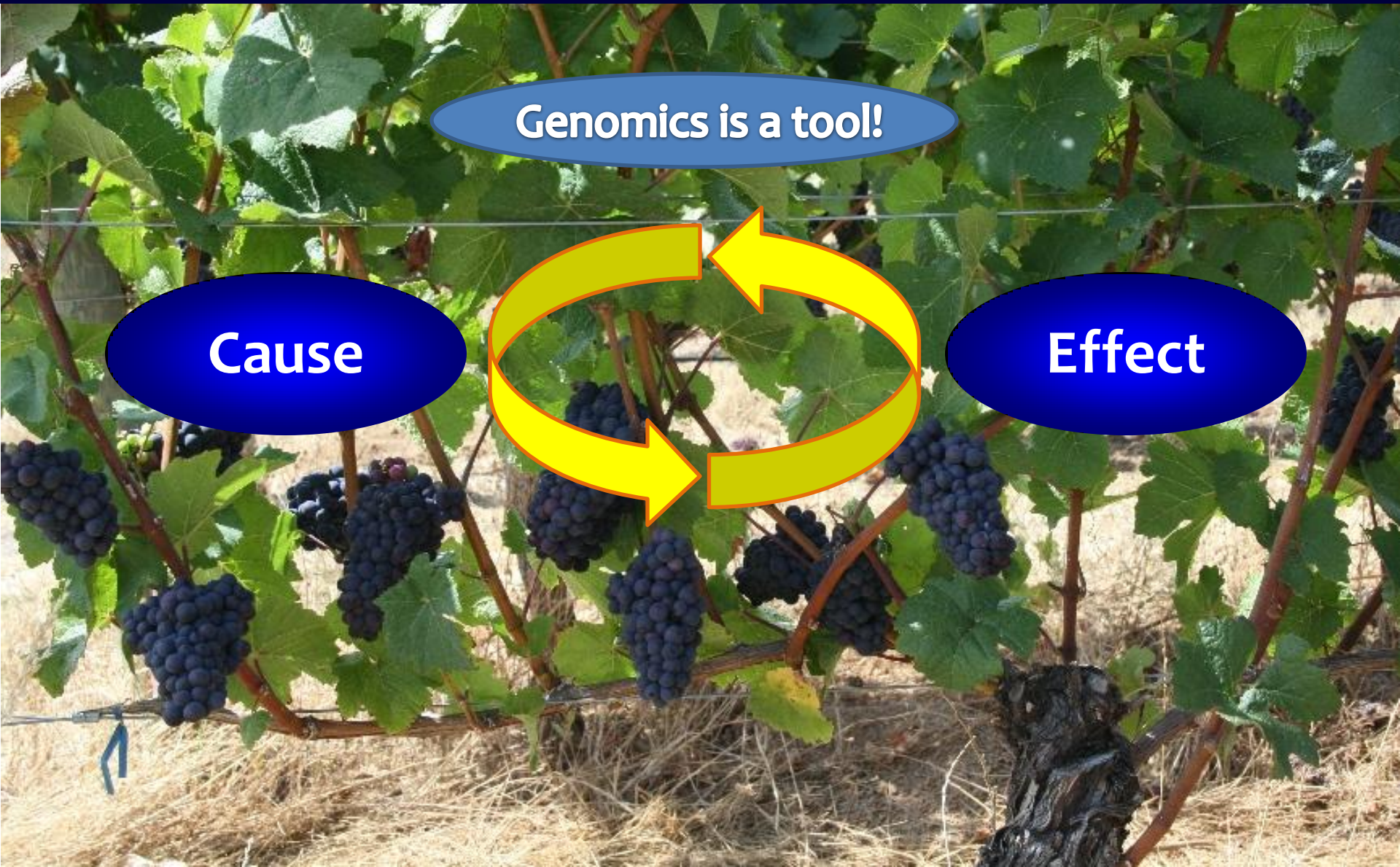
*ARS researchers have developed a relatively fast and inexpensive way to identify genetic markers in grapes that can be linked with specific traits such as fruit quality, environmental adaptation, and disease and pest resistance, which can speed up breeding better grape varieties. (Credit: Photo by Scott Bauer)*

# Investigating Physiology & Biochemistry

Genomics is a tool!

Cause

Effect



# Investigating Physiology & Biochemistry

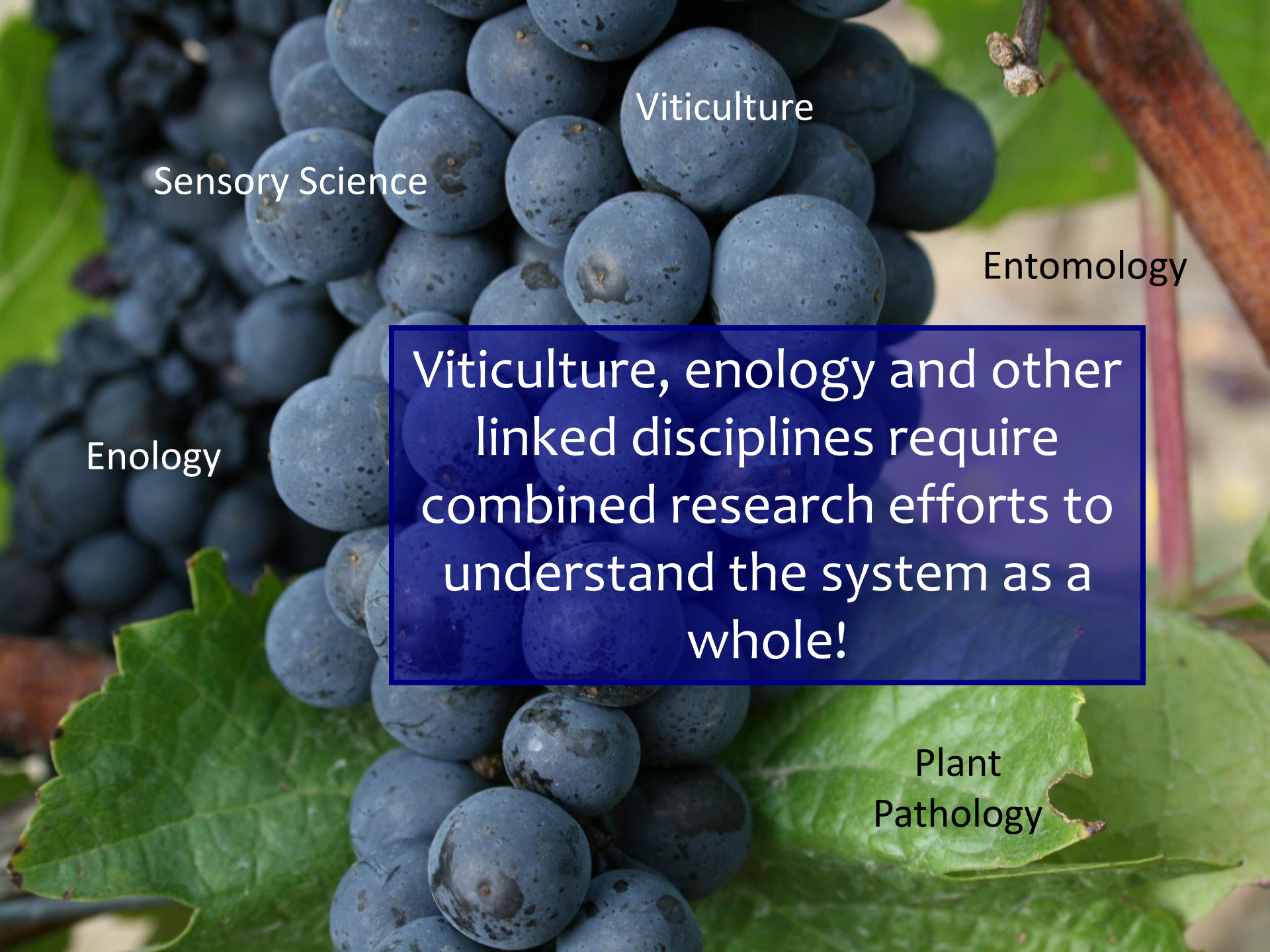
## Cause

Stressors: Drought,  
temperature, salinity  
Source-sink relationships  
Nutrition  
Management practices

## Effect

Whole Vine  
Organ (leaf, cluster)  
Cellular  
Gene





Viticulture

Sensory Science

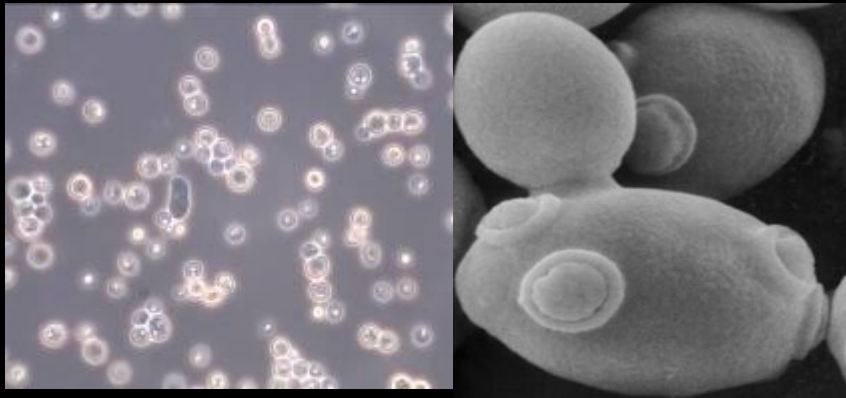
Entomology

Enology

Viticulture, enology and other linked disciplines require combined research efforts to understand the system as a whole!

Plant Pathology

Yeast microbiology  
Alan Bakalinsky, OSU



Powdery mildew forecasting  
Walt Mahaffee – USDA-ARS



Mycorrhizae populations  
Paul Schreiner, USDA-ARS



Grape Genomics  
Laurent Deluc, OSU  

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Metabolites  
Michael Qian, OSU  
Jungmin Lee, USDA-ARS



Virology  
Bob Martin, USDA-ARS



# Field Metrics and Biomarkers to Understanding Production Goals

- “Stop Vineyard Liposuction”
- Understand true vine balance
- Define **yield – quality** relationship
- Reduce canopy management inputs
  - 140 hours/acre
  - \$500/acre cluster thinning
  - \$90/acre hedging
  - \$270/acre leaf pulling



**\$860/acre**



Questions?