

Tree Fruits & Nuts

Engineering Solutions to Specialty Crop Challenges

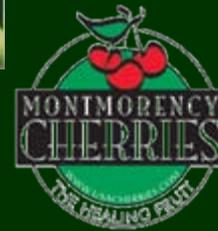
National Workshop

DC
24 Apr 07

Jim McFerson

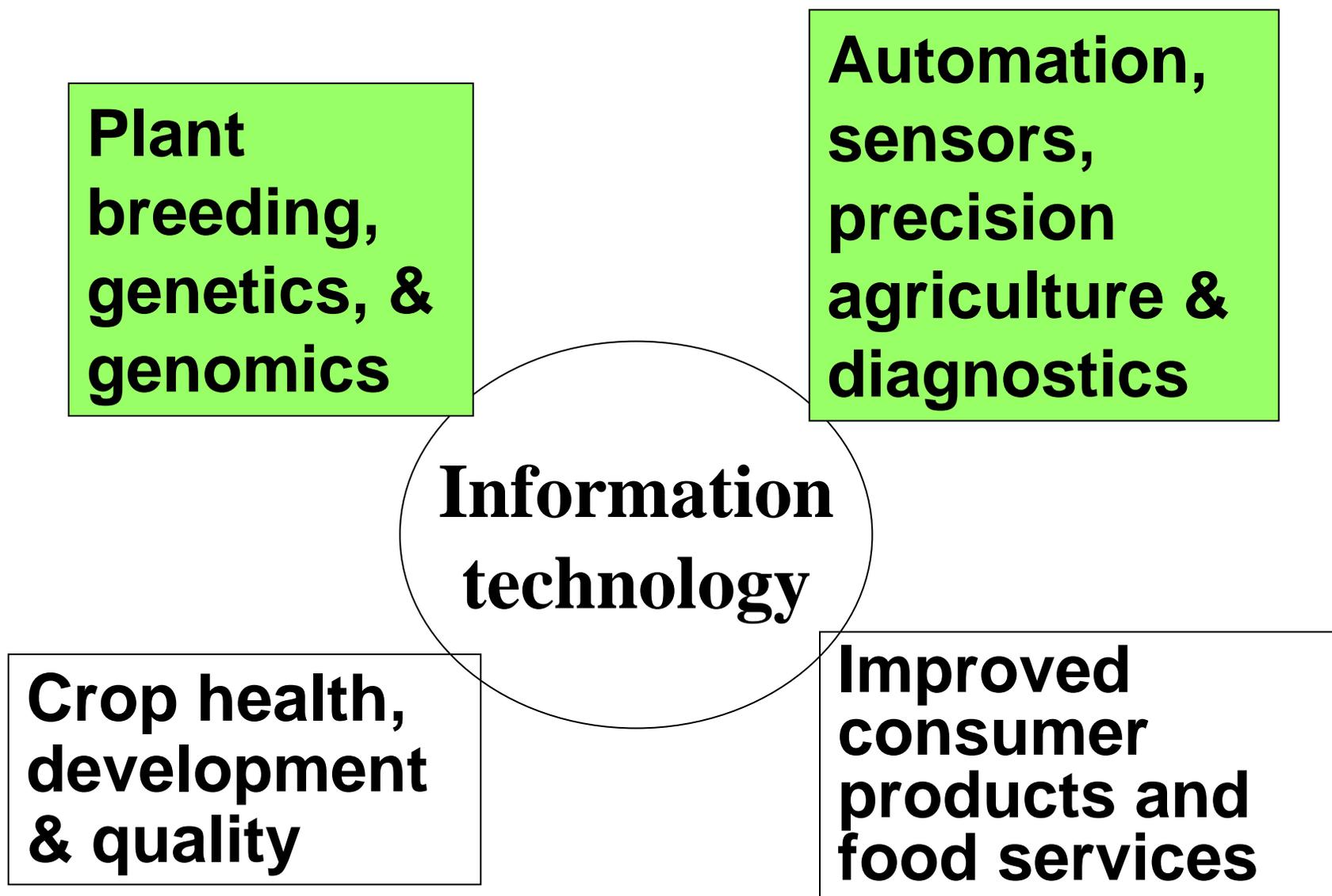
Washington Tree Fruit
Research Commission

Specialty Crop
Research Team



Technology Roadmap for Tree Fruit Production 2001

To be profitable in a globally competitive marketplace, the U.S. tree fruit industry must deliver the highest quality fruit and reduce production costs 30% by 2010



**Design
your
genetics**



**Design
your
orchards**



2000

Washington group develops initial vision and first Technology Roadmap

2001

National effort undertaken with representative steering group

2002

USApple and Northwest Horticultural Council propose FY2003 Congressional language

US Congress requests strategic document via USDA-ARS

2003

D.C. workshop creates vision statement to guide a National Technology Roadmap initiative

To be profitable in a globally competitive market, the U.S. tree fruit industry must deliver the highest quality fruit and reduce production costs 30% by 2010

US Congress requests national strategy: regional industry organizations establish priorities

Genomics, genetics, breeding

Automation, precision agriculture, sensors, diagnostics

2004

National Rosaceous genomics, genetics and breeding workshop

USDA-CSREES announces \$4M competitive grants program for Rosaceous crops

Washington tree fruit and wine grape industries receive \$750k FICA grant

2005

National Rosaceous Genomics, Genetics and Breeding Executive Committee (RosExec)

Washington industry proposes \$11.4M Center for Precision Agricultural Systems initiative (receives \$2.8M)

USDA-ARS fills new position for molecular genetics of fruit quality in Wenatchee WA

WSU fills new faculty position in bioinformatics,

Competitive Orchard Systems 2015 Initiative (WA, OR, CA, PA)

2006

WA Legislature approves \$880k for WSU AgWeatherNet

ARS fills new position for insect genomics in Yakima WA

ARS creates position for molecular plant physiology in Wenatchee WA

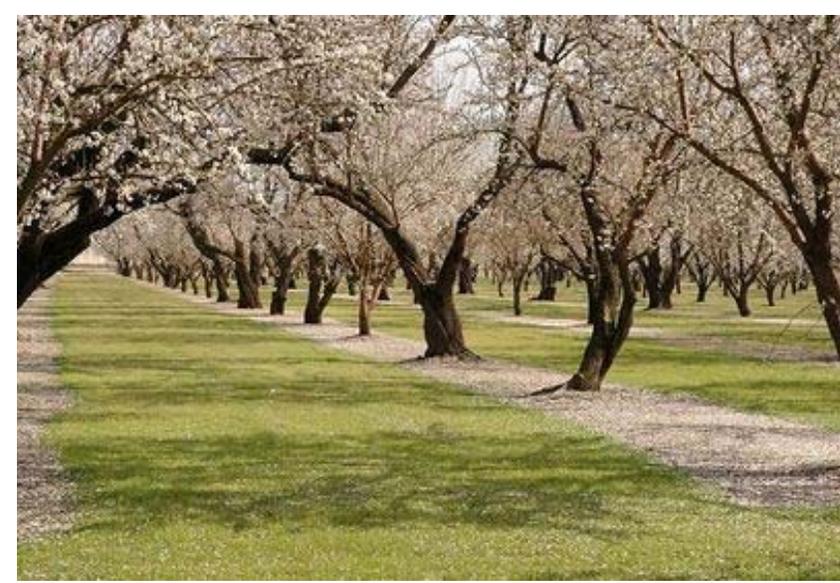
WSU fills two new faculty positions in Rosaceous crops genomics

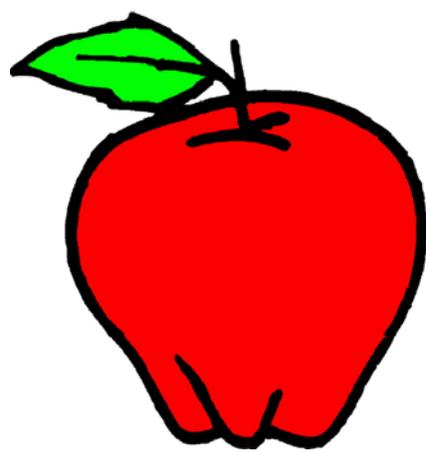
WSU announces 07 initiative with four new positions: precision agriculture, genomics

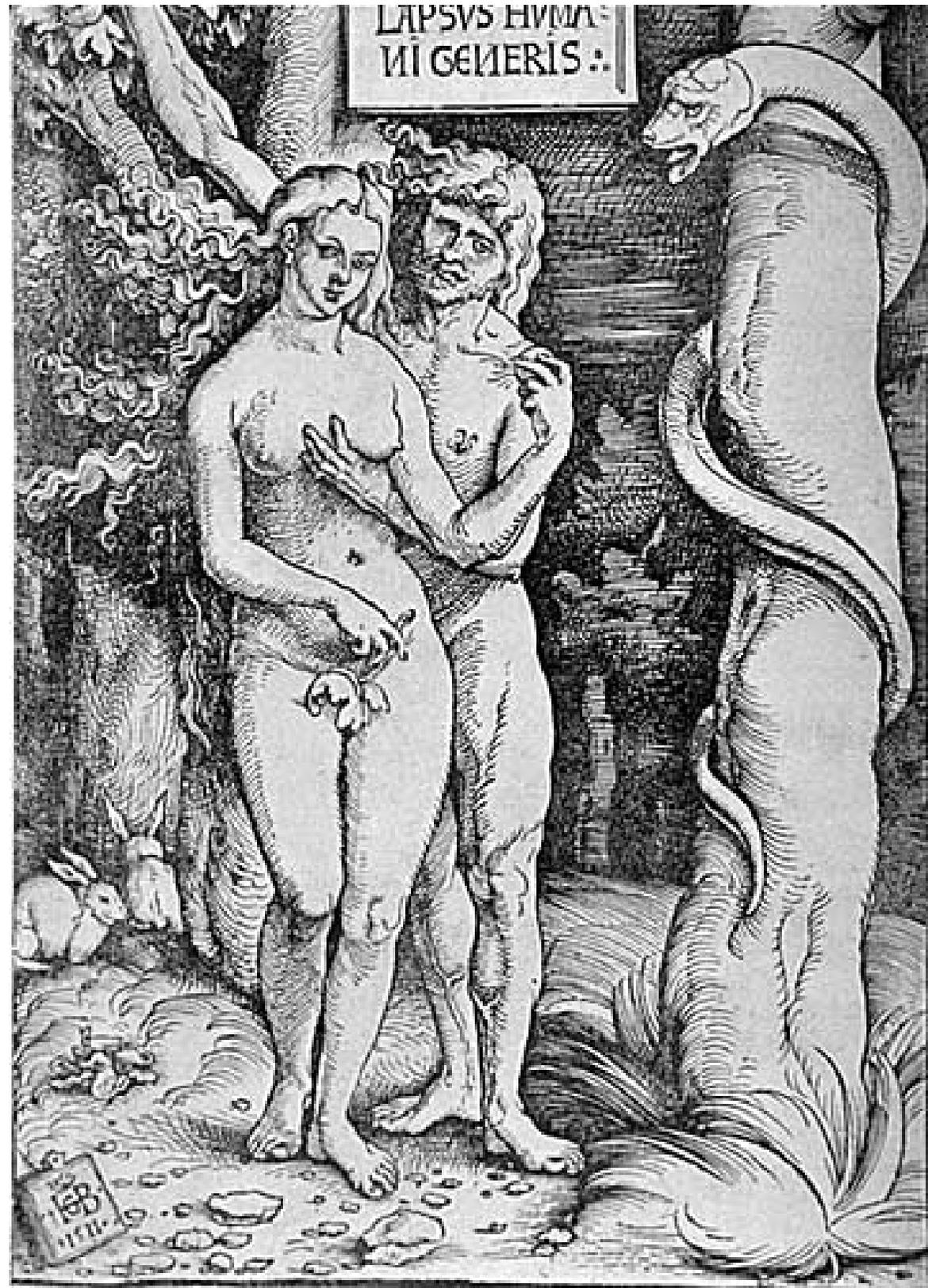
SCRT develops Position Paper

ROADMAP

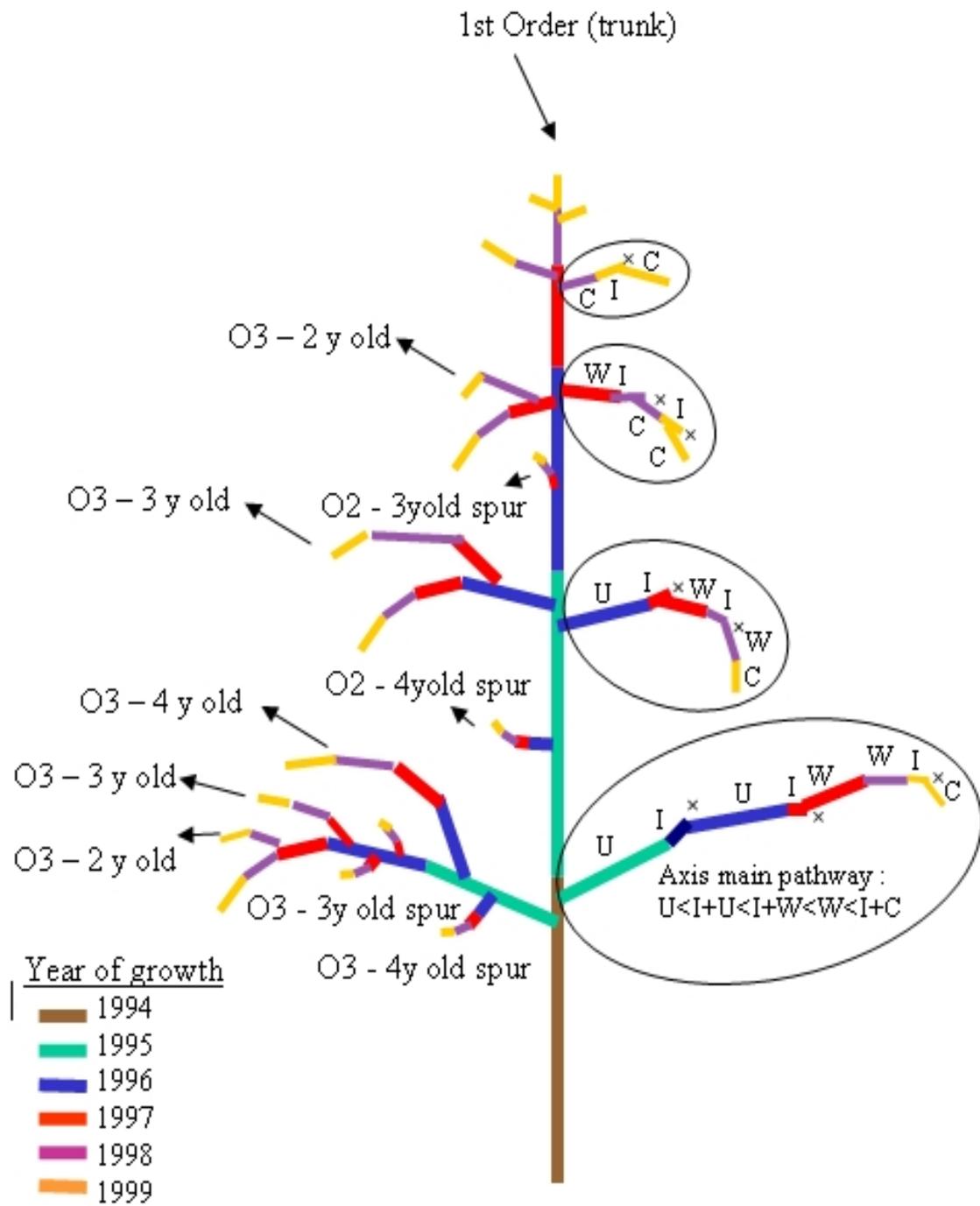
3D

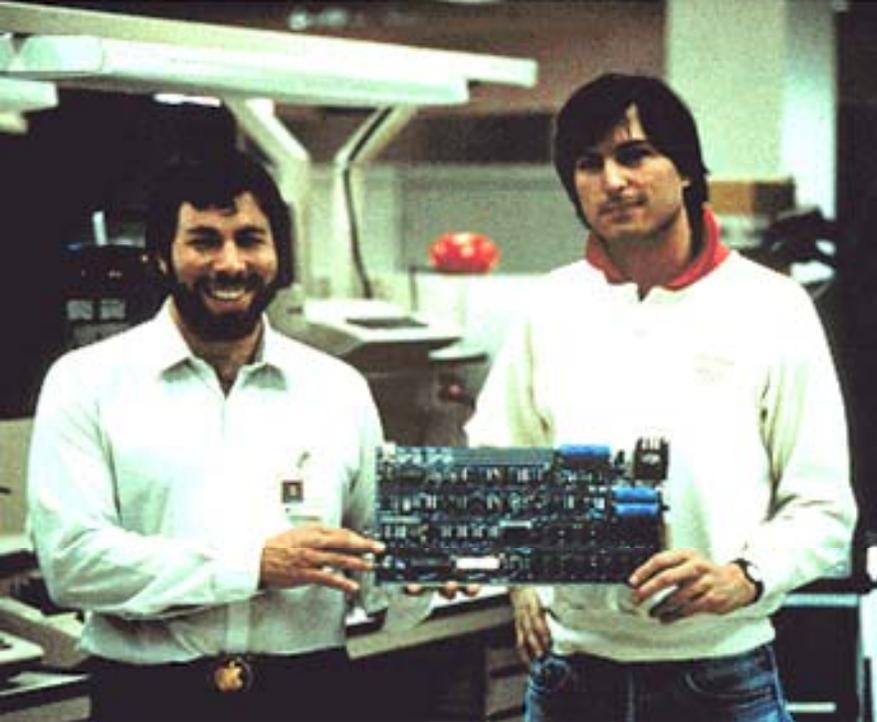


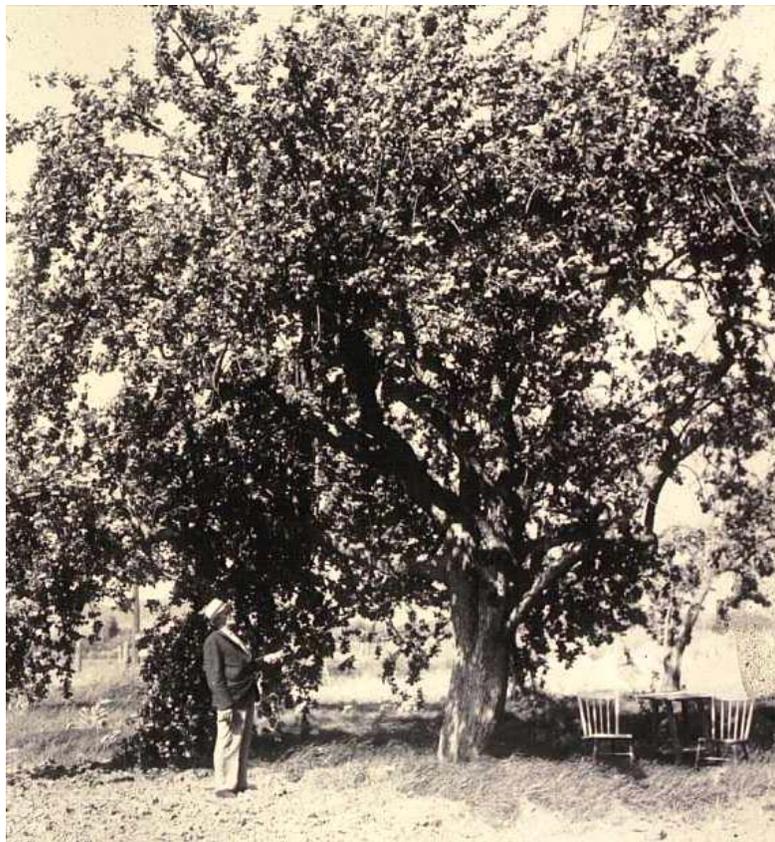














Modern orchards: Predictable & accessible Genetics and Engineering

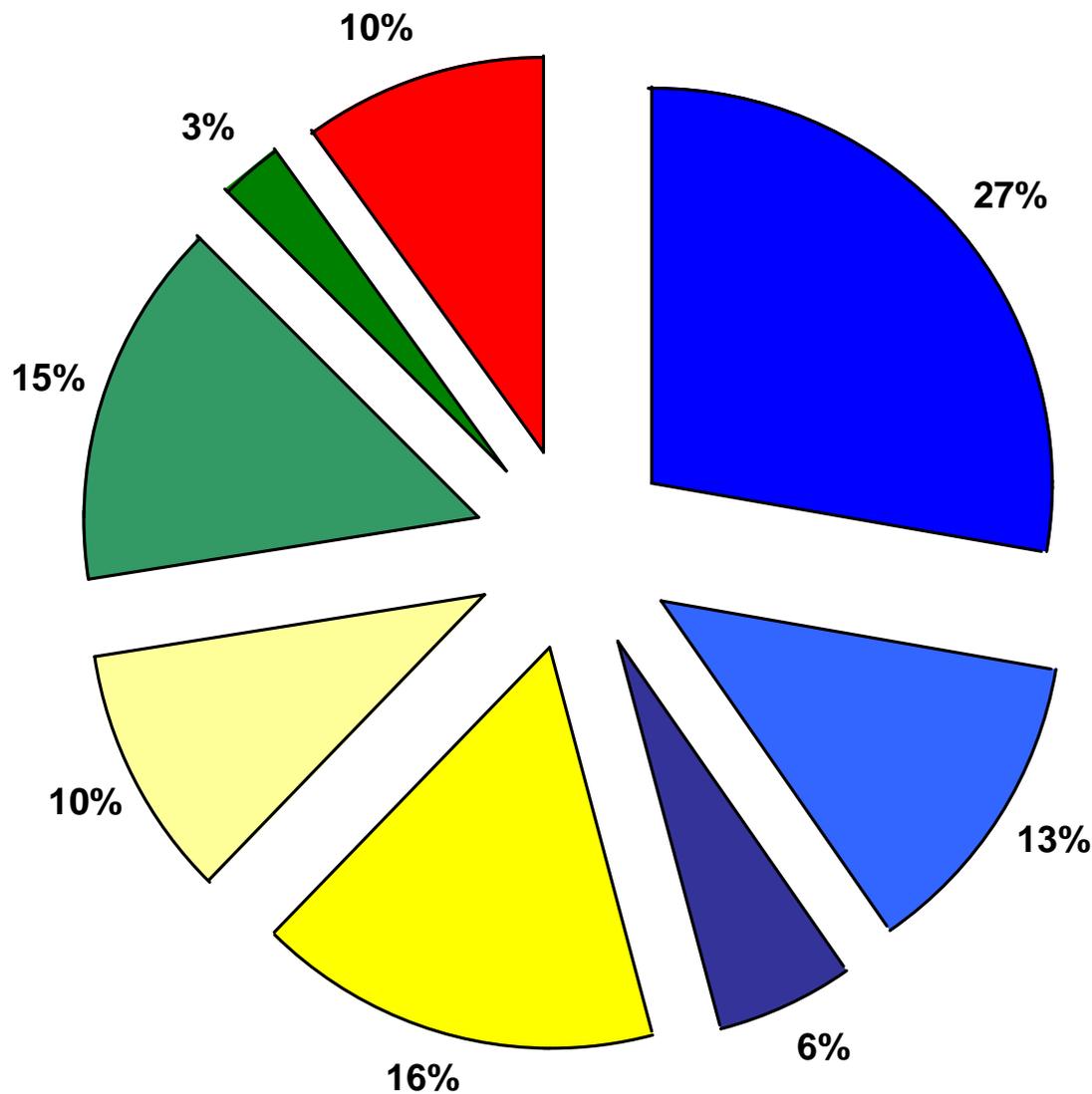


*Measure,
model,
and
manage*



Typical apple production and harvest costs

Clark Seavert



- Labor: pruning & thinning**
- Labor: harvest**
- Labor: other**
- Machine: fuel & repairs**
- Machine: replacement cost**
- Chemical: general**
- Chemical: fertilizer**
- Other costs**



Plant Propagation



Plant Propagation

Soil, water, & nutrition management



Production Systems





Crop Load Management

Crop health





Crop Quality Management



1931 FORRESTER ORCHARD









Harvest Management



Postharvest handling & processing



Putting the pieces together



Orchard design



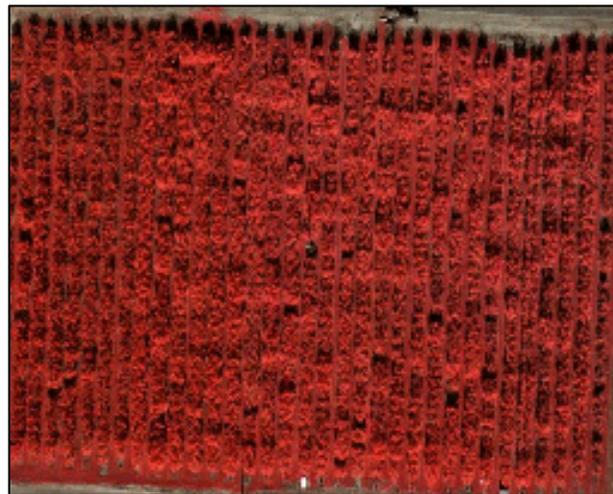
Robotic tractors



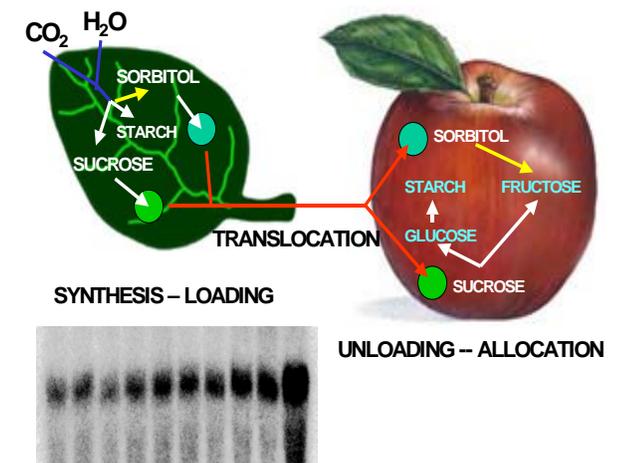
Water management



Harvest assist



Remote



Genetics/Genomics

USDA, NASA LAUNCH PARTNERSHIP TO ADVANCE REMOTE SENSING TECHNOLOGIES AND APPLICATIONS

WASHINGTON, May 30, 2003. Agriculture Secretary Ann M. Veneman and National Aeronautics and Space Administration (NASA) Administrator Sean O'Keefe today launched a partnership that will utilize earth science such as remote sensing technologies to protect the environment and enhance the agricultural competitiveness of American farmers and ranchers. Veneman and O'Keefe signed a Memorandum of Understanding (MOU) that permits USDA to draw on the best scientific and technical information available from NASA in monitoring, mapping, modeling and systems engineering. The primary purpose of this new cooperative effort is to help increase the production efficiency of farmers while continuing to reduce the cost of production by bringing more practical benefits of science and technology into agricultural applications. Precision agriculture practices are helping farmers improve productivity while protecting our natural resources, said Veneman. This partnership with NASA will make available remote sensing technologies that will advance precision agriculture. An immediate outcome of the new partnership is a \$1 million, 3-year program to establish Geospatial Extension Programs at land grant universities. Geospatial extension specialists work closely with NASA and USDA to address geographic information systems/remote sensing needs of the agricultural community. Among the technological advances available to farmers from precision agriculture techniques are:

- Monitors and maps that can detect and record changes in yields, soil attributes or crop conditions, including pest infestations and water nutrient stress.
- Technologies that use information from sensors to vary the application rate and timing for seeds, fertilizers, pesticides and irrigation water.
- Vehicle guidance systems that provide on-the-go sensing for weed and pest populations and detect crop traits, such as protein or oil content, during harvest.

"NASA is pleased to be part of this worthwhile effort, which will benefit all Americans," said NASA Administrator Sean O'Keefe. "NASA's unique ability to view the Earth from space will enhance our ability to predict climate, weather and natural hazards, as well as to mitigate and assess the effects of natural and human-induced disasters. The information we provide will allow our research partners to make critical, accurate and timely decisions." This joint endeavor could also spawn information that will contribute to project plans for NASA's Earth Science Enterprise, an initiative to develop a scientific understanding of the Earth's response to natural or human-induced changes.

Veneman said that such technology would also be highlighted at the upcoming Ministerial and Expo on Agricultural Science and Technology June 23-25 in Sacramento, Calif. where ministers from over 180 countries will discuss and share science and technological innovation in agriculture. For more information on the conference, you can visit <http://www.fas.usda.gov>.

**Design
your
genetics**



**Design your
perennial
cropping
system**



Labor Education & Research Project

LABOR NOTES

P.O. BOX 20001, DETROIT, MICHIGAN 48220 PHONE (313) 883-5580 FEBRUARY 21, 1980 #13 \$5/YEAR

Agriculture Dept. Says 'No' To Job-Destroying Mechanization

In Washington, Agriculture Secretary Bob Bergland announced January 31 that the federal government will no longer provide research funds for agricultural mechanization projects which result in eliminating farm worker jobs.

Bergland's statement is a welcome development, as farm worker jobs by the thousands are being lost to machines. In many cases, such as in harvesting tomatoes, machines also require a tougher product, inferior to the hand-picked variety.

In making the announcement, Bergland said: "I do not believe a

federally financed research effort ought to benefit a small number of individuals, corporations or narrow interest groups to such an extent and in such a way as to make it possible [for them] to gain control of the market, monopolize the sources of finance at every step, and increase their profits by selling what may well be an inferior product at a price that is insulated from competition.

Such research, Bergland declared, ought to be done "by private enterprise - either by itself or with the help of states that are willing to help." One

(continued on page 3)

“USDA believes that, if U.S. producers are to successfully compete with low-wage countries in the global marketplace, it will be necessary to **increase U.S. labor productivity**. It is also true that the agricultural industry's current dependence on illegal alien workers is probably not sustainable nor is there the level of concern about displacement of such workers as existed in the past with respect to U.S. workers. Ideally, **labor saving technology could be directed so as to create better jobs for U.S. workers and less dependence on unauthorized workers.**

SBIR GRANTS: INITIAL HITS

Plant Production and Protection: Engineering

A low cost electrocatalytic sensor for ppb determination of ethylene in air (05 Phase 2)

Reza Shekarriz

Microenergy Technologies, Inc.

Portland OR

A new technique for automatically filling a storage bin with fruit without the use of water (05 Phase 1)

Malcolm Hanks

Hardco LLC

Yakima WA

A simple ethylene-detecting device to determine ripeness of individual apples in orchard (06 Phase 1)

Robert Klein

RediRipe

Albuquerque NM

Food Science and Nutrition

Spatial-frequency-domain imaging instrument for quality assessment of apples (05 Phase 1)

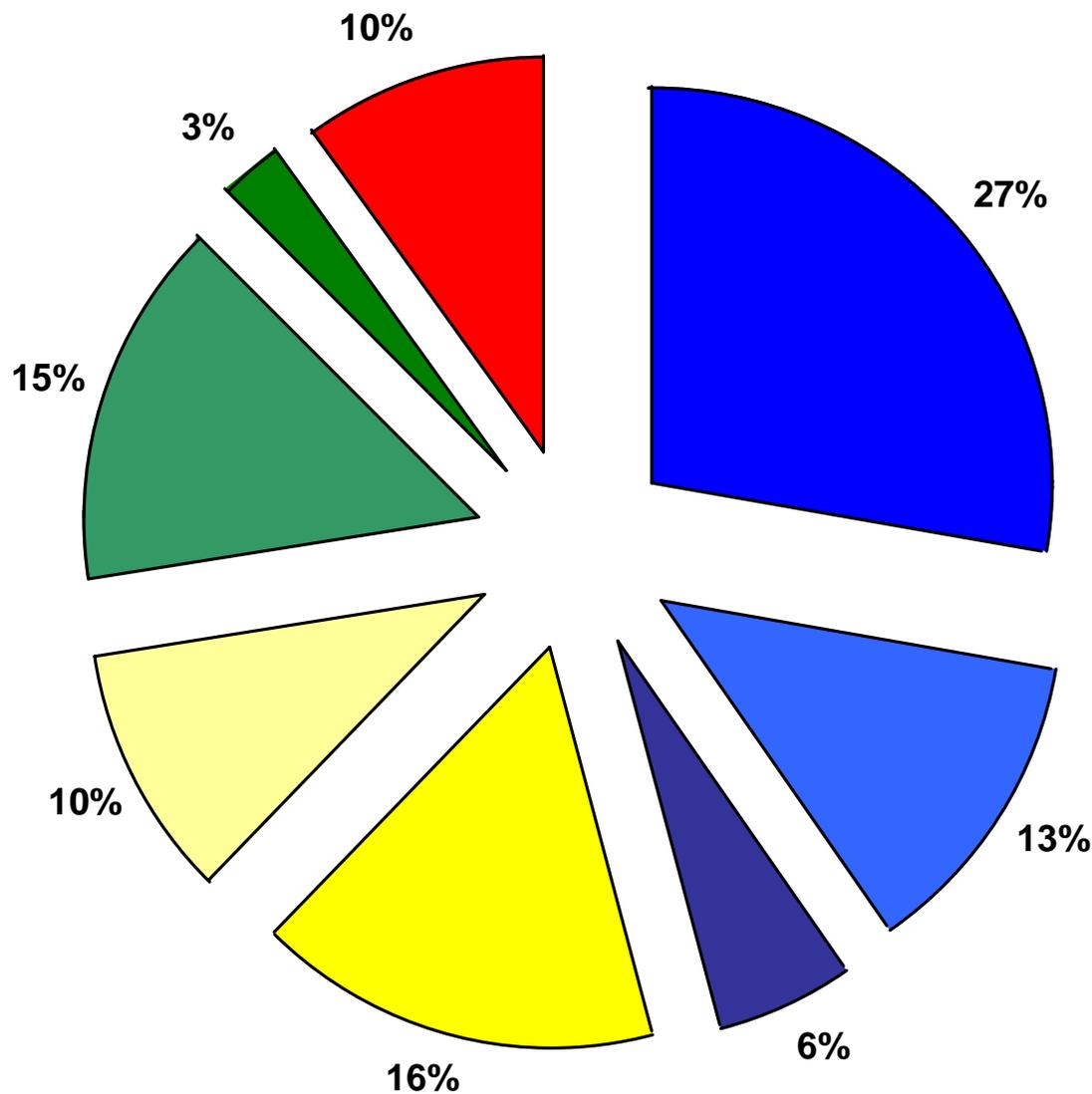
E.R. Anderson

EA Photonics

Redondo Beach CA

Typical apple production and harvest costs

Clark Seavert



- Labor: pruning & thinning**
- Labor: harvest**
- Labor: other**
- Machine: fuel & repairs**
- Machine: replacement cost**
- Chemical: general**
- Chemical: fertilizer**
- Other costs**



THANK YOU

USDA-ARS (Jeff Steiner)

USDA-CSREES (Dan Schmoldt)

NASA

NSF

WORKSHOP STEERING GROUP

WORKSHOP PARTICIPANTS

GETTING STARTED

Initiate workshop process to develop a strategic plan in Specialty Crop automation, precision ag sensors, and diagnostics -- *underway*

Create CSREES \$5 million competitive grant program

Increase ARS resources

Reinforce collaboration among federal agencies and Specialty Crop industries