Landscape Features Proven To Reduce Runoff

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UCDAVIS ENVIRONMENTAL DESIGN Landscape Architecture

UCDAVIS PLANT SCIENCES

Photo: L.Oki

Presentation topics

- Background
- Research on runoff from homes
- Renovation case study
- Landscape demonstration site
- Other features

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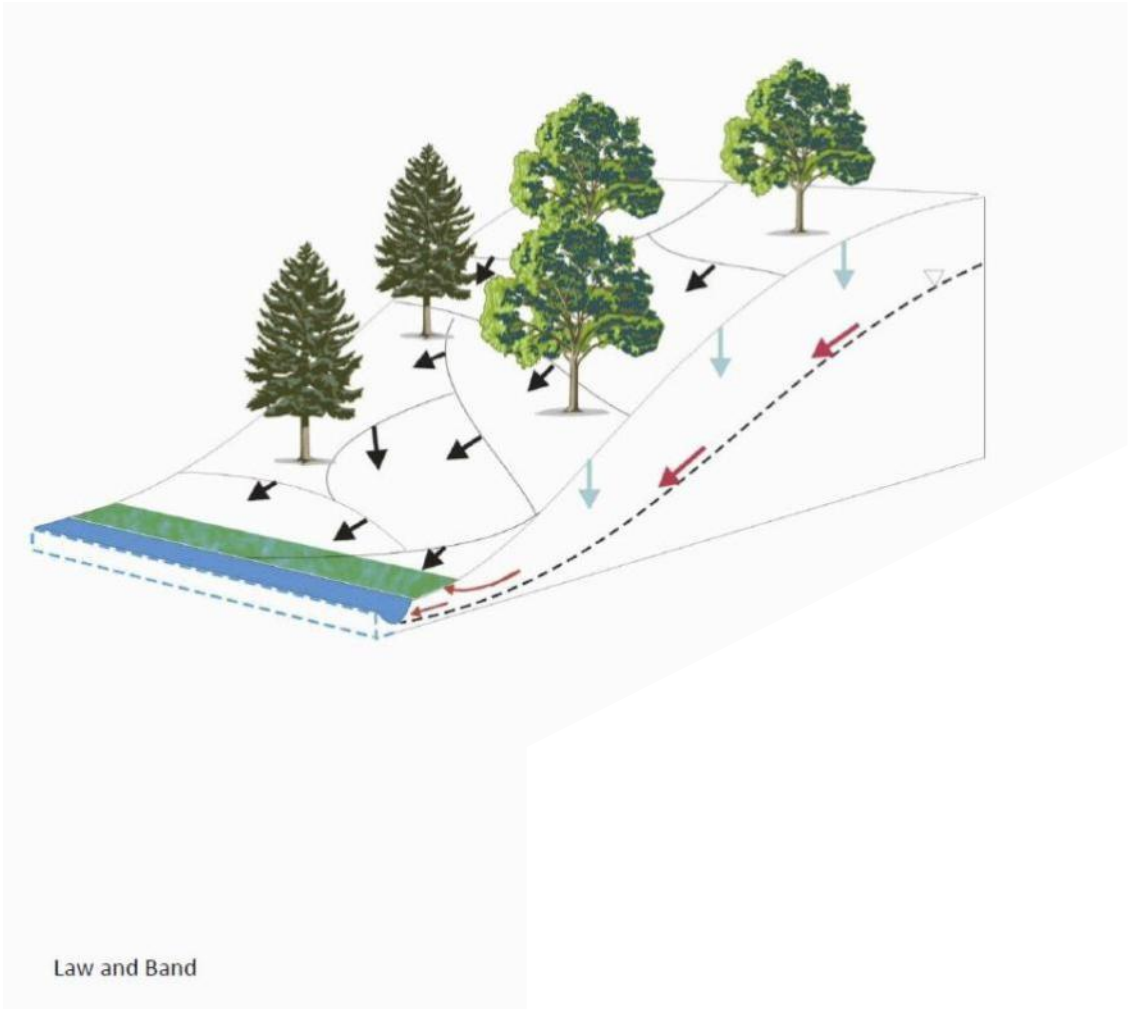
Flow modification



From M. Cadenasso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Pesticide Application

Irrigation Management

Photos: D. Haver

Photo: D. Haver

Photo: L. Oki

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Presentation topics

- Background
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Landscape Features

Features that generate runoff

Discussion of research paper

Q. Xiao, E.G. McPherson, J.R. Simpson, and S.L. Ustin. 2007. Hydrologic processes at the urban residential scale. Hydrol. Process. 21: 2174-2188.

Landscape Features

Discussion of research paper

What they did

2 residential landscapes in L.A.

Modified one

- Lawn catchments
- Gutters and downspouts
- Rain collection
- Upgraded irrigation system
- Slot drains on driveway

Landscape Features

Discussion of research paper

What they did

2 residential landscapes

Data: rainfall, irrigation, runoff

Developed hydrologic model

- Simulates runoff and landscape irrigation water use

Landscape Features

Discussion of research paper

What they found

- Landscape irrigation reduced – 53%
  - Increasing irrigation system efficiency
  - Adjusting application rates based on plant water demand
- Loam v. clay soils
  - 63% difference in runoff

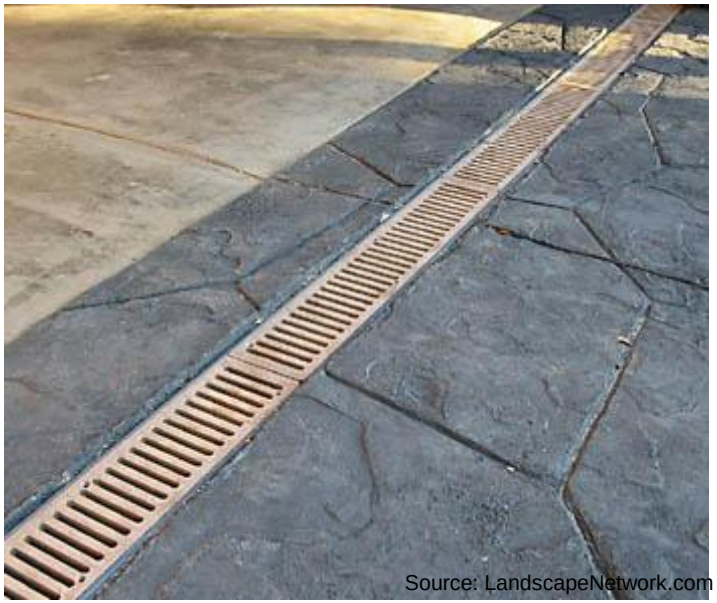
Landscape Features

Discussion of research paper

What they found

Annual storm runoff was reduced 97%

- Driveway interceptor – 65%
- Rain gutter installation – 28%
- Lawn retention basin – 12%



Source: LandscapeNetwork.com

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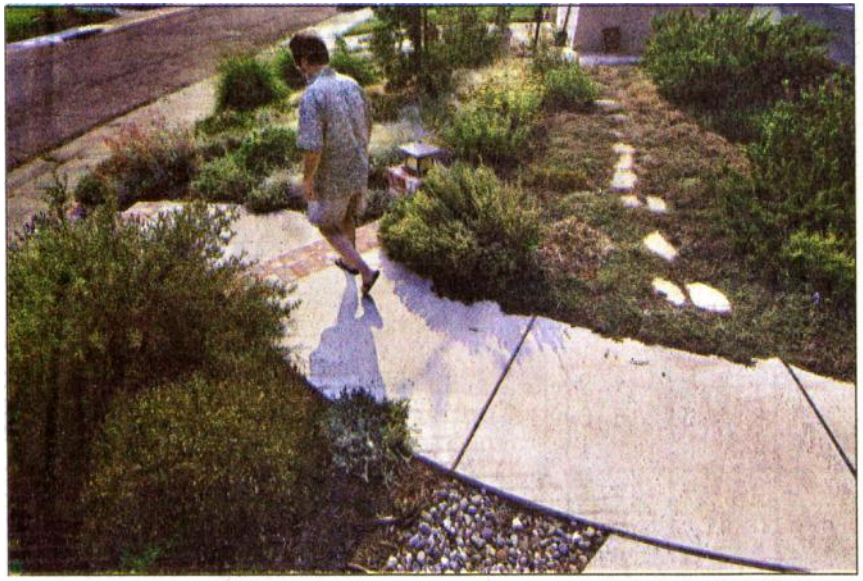
The Sacramento Bee

K

SATURDAY, JULY 12, 2008

HOME&GARDEN



Randall Benton/rbenton@sacbee.com

Rick Soehren turned a typical suburban lawn into a water efficient garden filled with Mediterranean and California native plants. He loves to watch the garden change with the seasons. "It changes daily. But there's always something in bloom," he says.

They said goodbye to thirsty lawns

By Pat Rubin

prubin@sacbee.com

Neither days of blasting, furnace-like heat nor hours of relentless sunshine can harm the water-

and red – flowers. The thyme walk across the front of Soehren's house is a haze of purple, and California poppies spread their cheerful orange blooms throughout the garden

Photo: D. Roberts


Photo: D. Roberts

Landscape Features

Landscape Features

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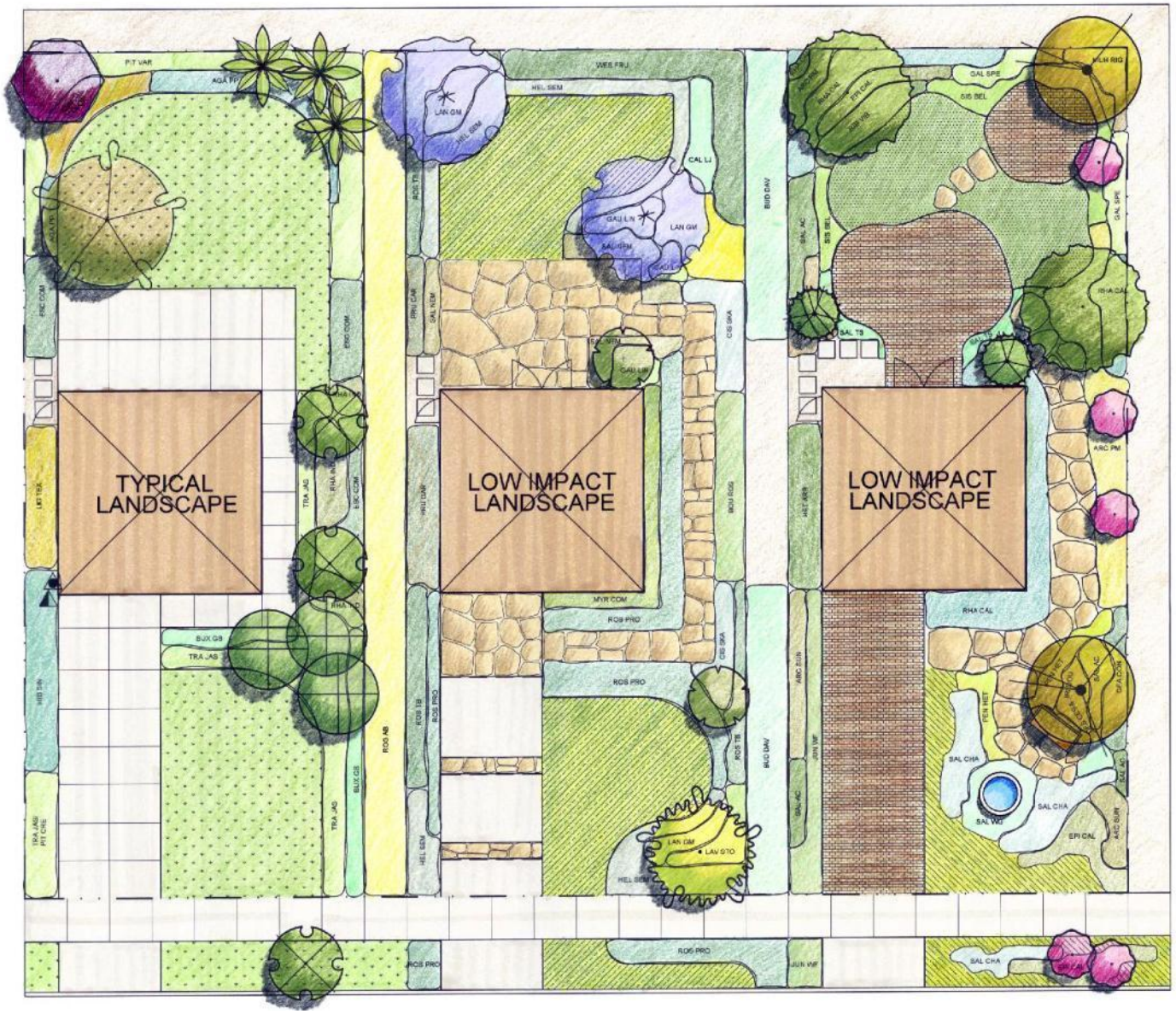
Landscape Demonstration Sites

South Coast Research & Extension Center



Landscape Demonstration Sites

South Coast Research & Extension Center

"Typical" Landscape

- Exotic species
- Tall Fescue lawn
- Trees in turf
- Concrete surfaces
- Drain line to street
- Spray heads
- Automatic timer
  - -4 irrigation zones

Graphics

Landscape Demonstration Sites

South Coast Research & Extension Center

Low Impact Landscape 1

- Mediterranean species
- Warm season turfgrass species
  - ‘UC Verde’ buffalograss
  - ‘Sea Spray’ seashore paspalum
- Slot drains in driveway
- Flagstone walkways and patioG
- Rain harvesting from roof
- Low flow spray heads
- Irrigation based on soil moisture
- 10 hydrozones

Example: Roof Square Footage
= 500 square feet

1” of rain x (0.6) x 500 square feet
= 300 gallons

Average Sacramento rainfall is approx. 20”
= 6,000 gallons

Landscape Demonstration Sites

South Coast Research & Extension Center

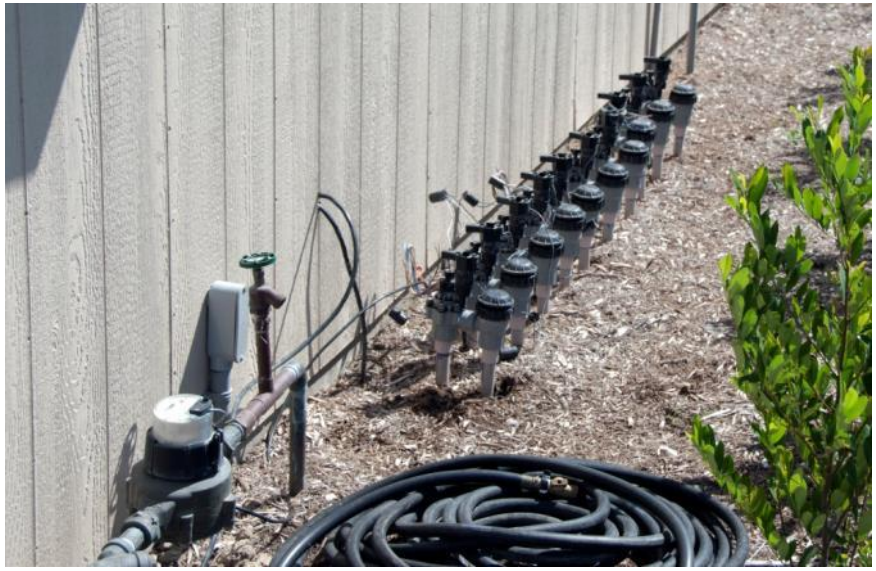
Low Impact Landscape 2

- Climate-adapted species
- Meadow (*Carex species*)
- Interlocking pavers
- Flagstone walkway in DG
- Dry well for roof runoff
- Drip irrigation
- ET-based irrigation
- 24 hydrozones

Graphics: Clark & Green

Roof runoff directed to dry well to allow reinfiltration

Designed for Data Collection



Water Use & Surface Runoff

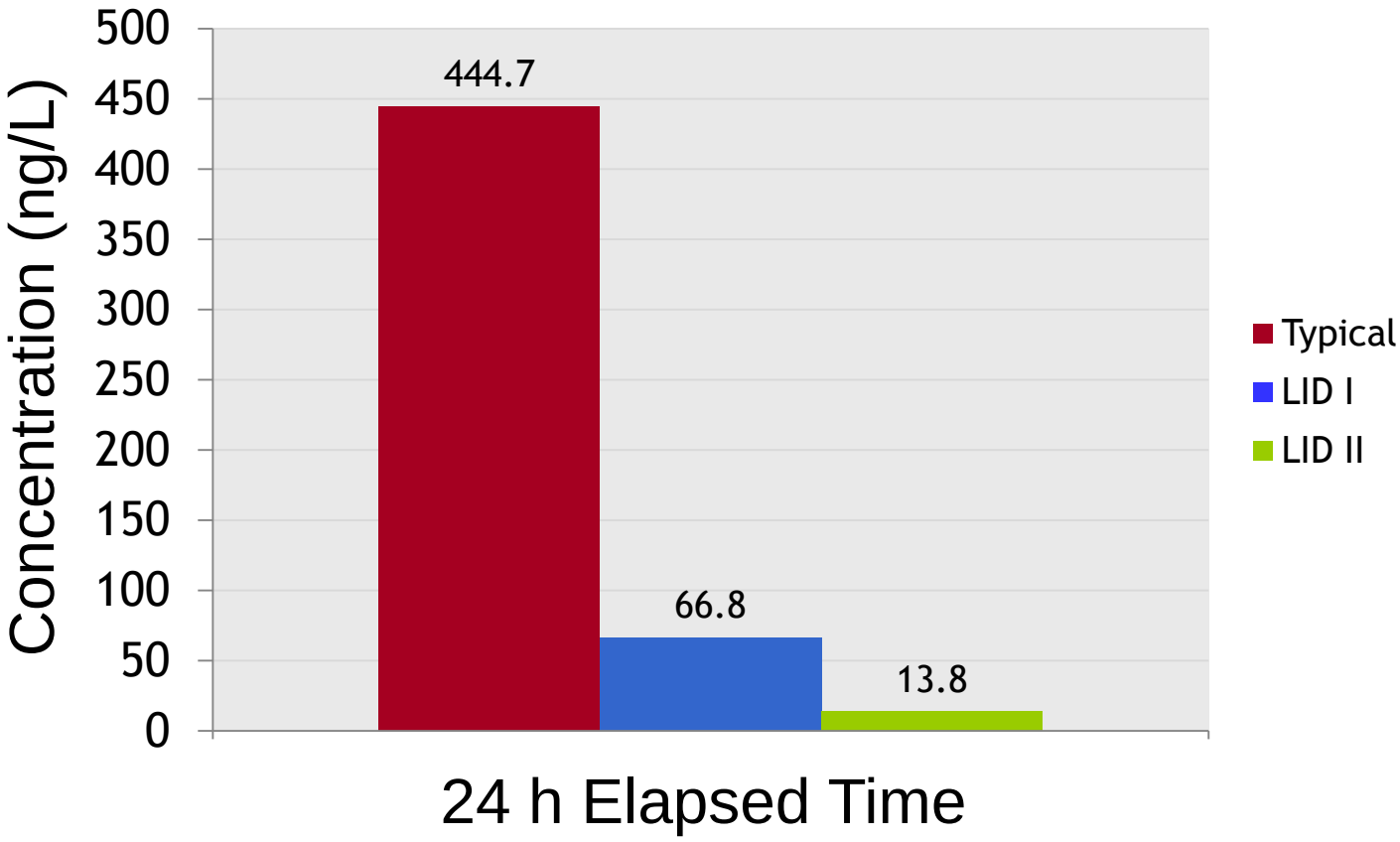
Landscape Type	Water Use (daily average, gal)	Surface Runoff (daily average, gal)
Feb 2007 through April 2008		
Typical	879	21
LID Type 1	287	6
LID Type 2	372	8
Feb 2007 through Sep 2012		
Typical	499	15
LID Type 1	239	3
LID Type 2	218	5

Irrigated landscape area
Typical = 2800 sq. ft. LID Type I = 2700 sq. ft. LID Type 2 = 2400 sq. ft.

Methods

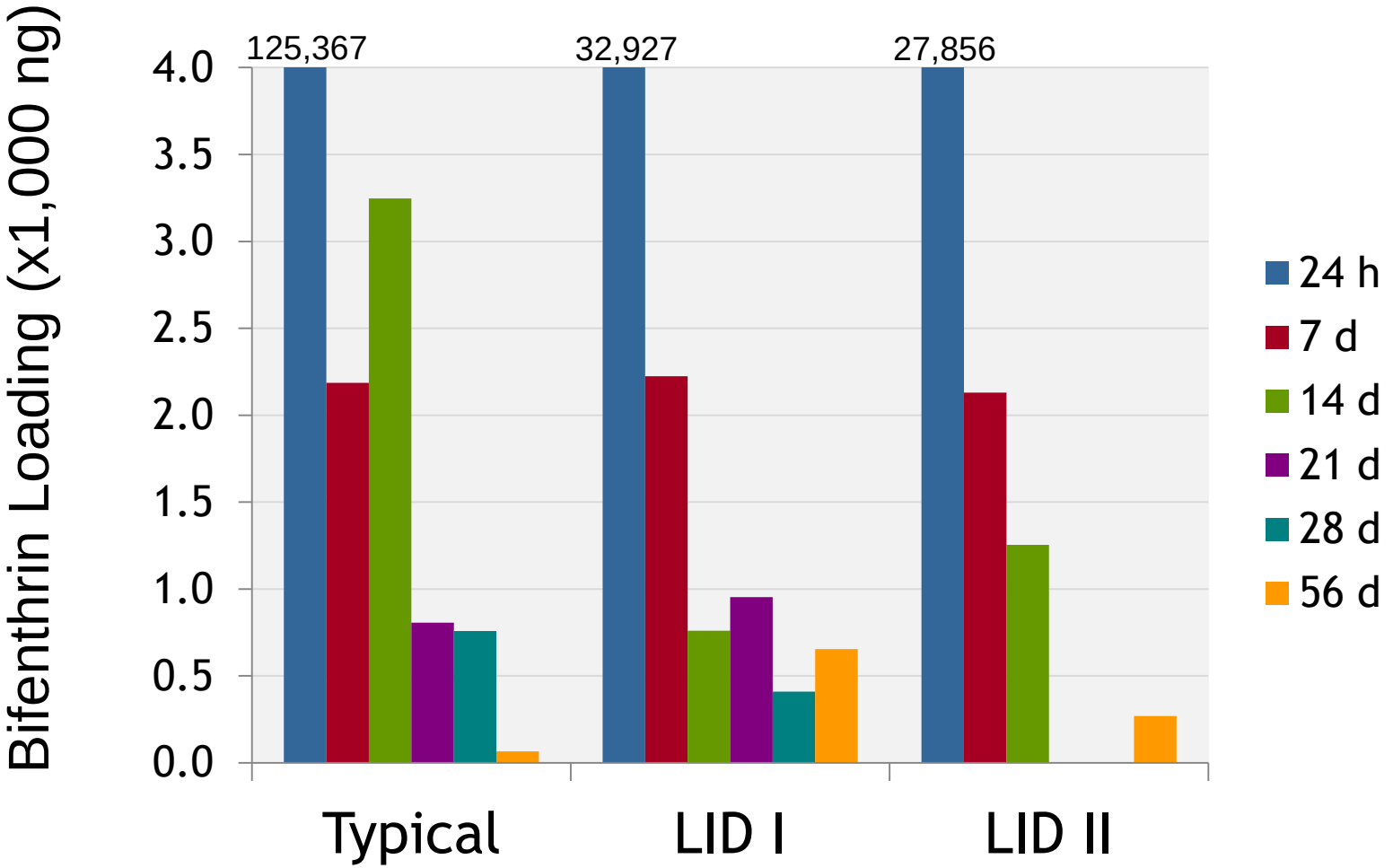
- Pre-Treatment Wash
  - Background levels of pesticides (previous studies)
- Perimeter Pesticide Treatment
  - 1 foot out, 1 foot up fan spray around perimeter
  - Fipronil at 0.06% (0.9654 g a.i. to each landscape)
- Lawn and Garden Treatment
  - RTU hose-end product
  - 0.3% bifenthrin ≈ 0.9449 g a.i. to each landscape
- Hardscapes washed at defined intervals

Fipronil
In Wash Water



Bifenthrin Loading

Hardscape Washing



Total recovered 0.13g 0. 038g 0. 032g

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Landscape Features

Oki


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Key Components for Success

- Plant Selection
- Irrigation design and management
- Hydrologic design
  - Water that falls on the yard, stays in the yard.
- Plan for maintenance

A Few Things to Think About

- Infiltration may cause more harm than good!
  - Shallow groundwater
  - Expansive soils
- Poor maintenance of water features
  - Reduction in performance
  - Stagnant water
  - Favorable environment for mosquitoes


Thank you
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