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Agriculture and Natural Resources | Cooperative Extension

Efficient Irrigation Practices

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2) Irrigation and Crop Requirement
3) Irrigation Efficiency
4) Efficient Irrigation Practices
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   - Irrigation Scheduling
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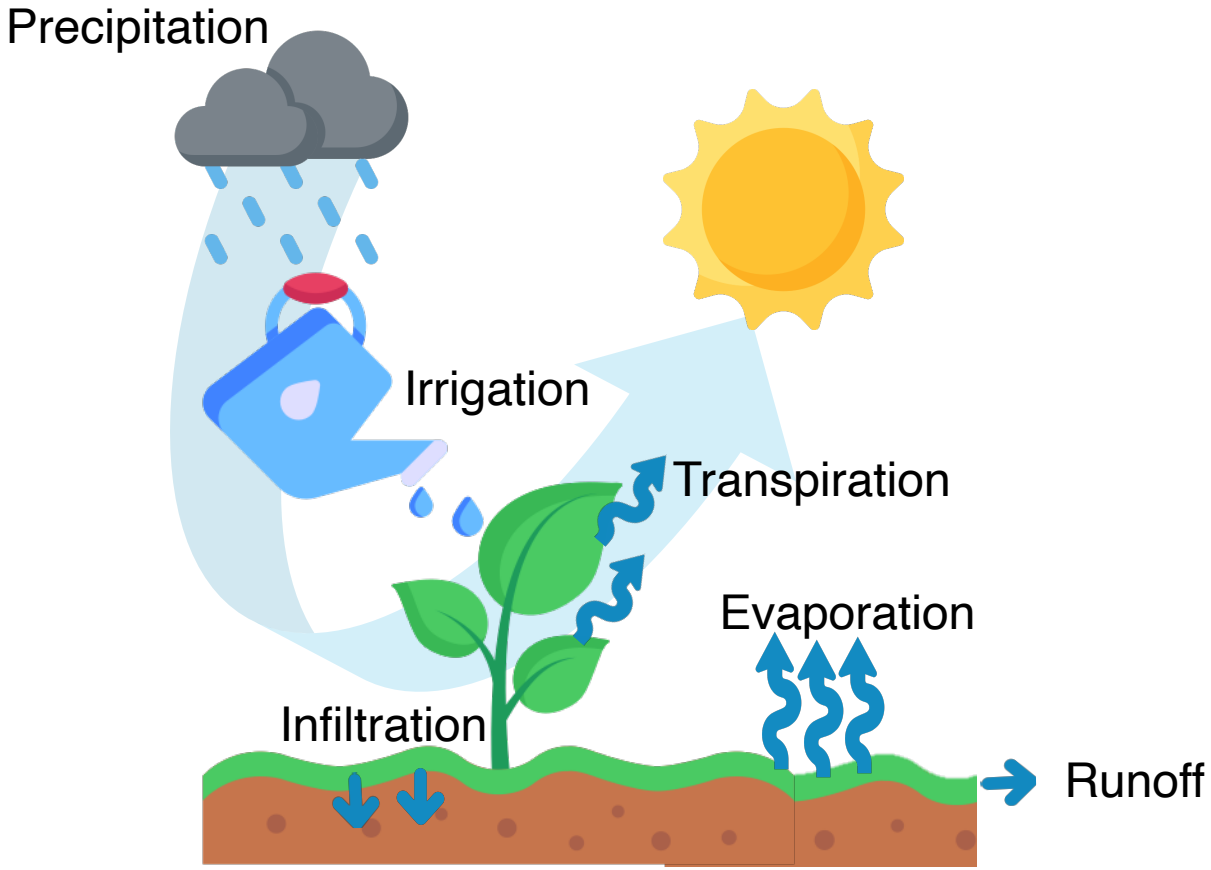
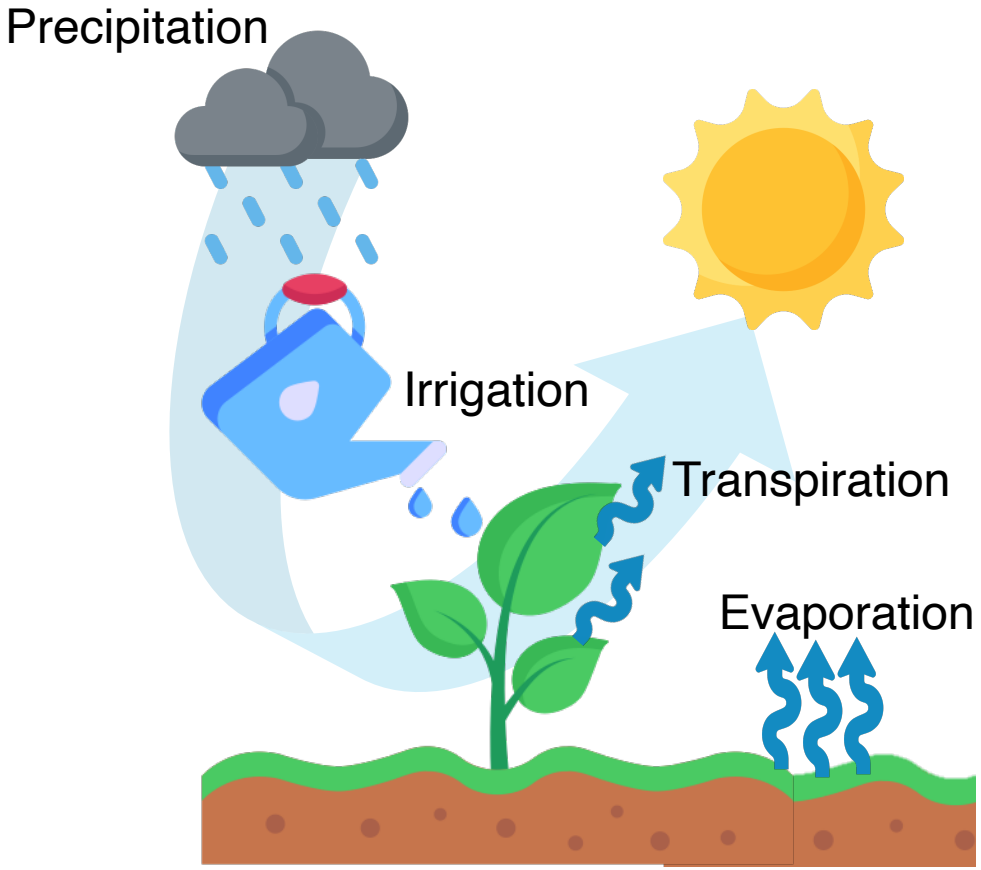
5) Benefits

IRRIGATION 101
Water Budget



IRRIGATION 101

Water Budget



Evapotranspiration (ET)

Loss of water through
Evaporation + Transpiration

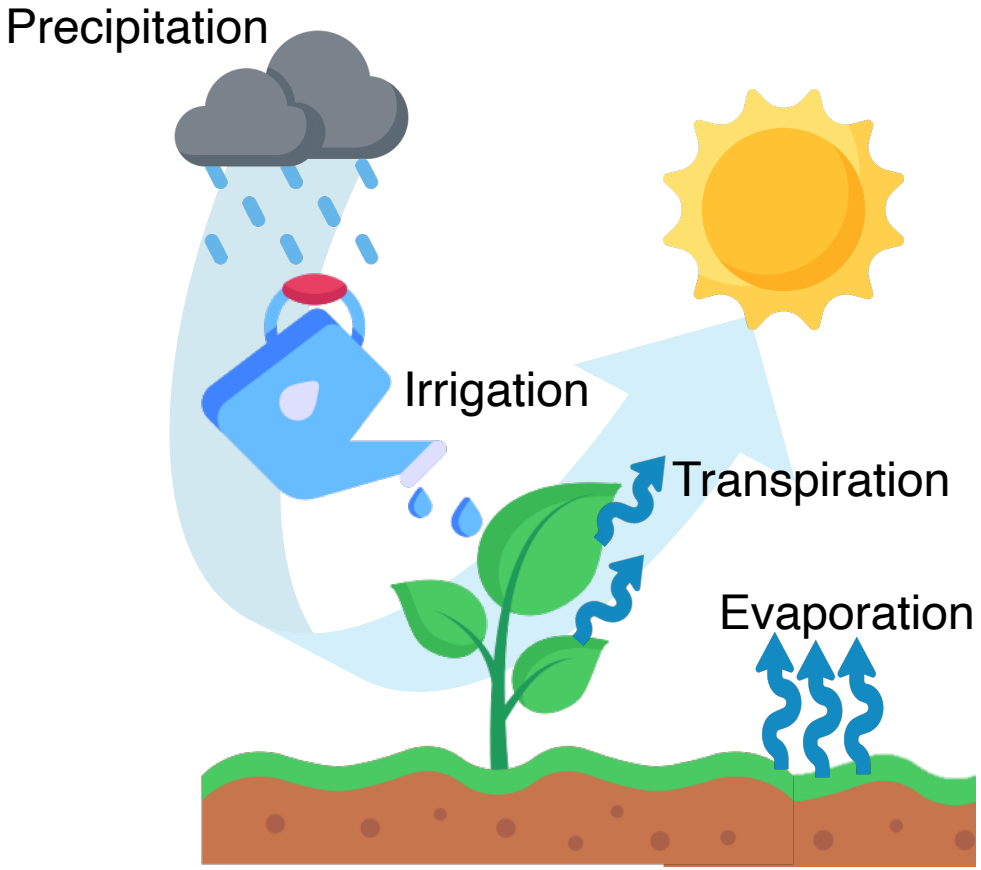
Soil

Plants

ET = Crop water needs

IRRIGATION 101

Water Budget



Factors Affecting Evapotranspiration (ET)

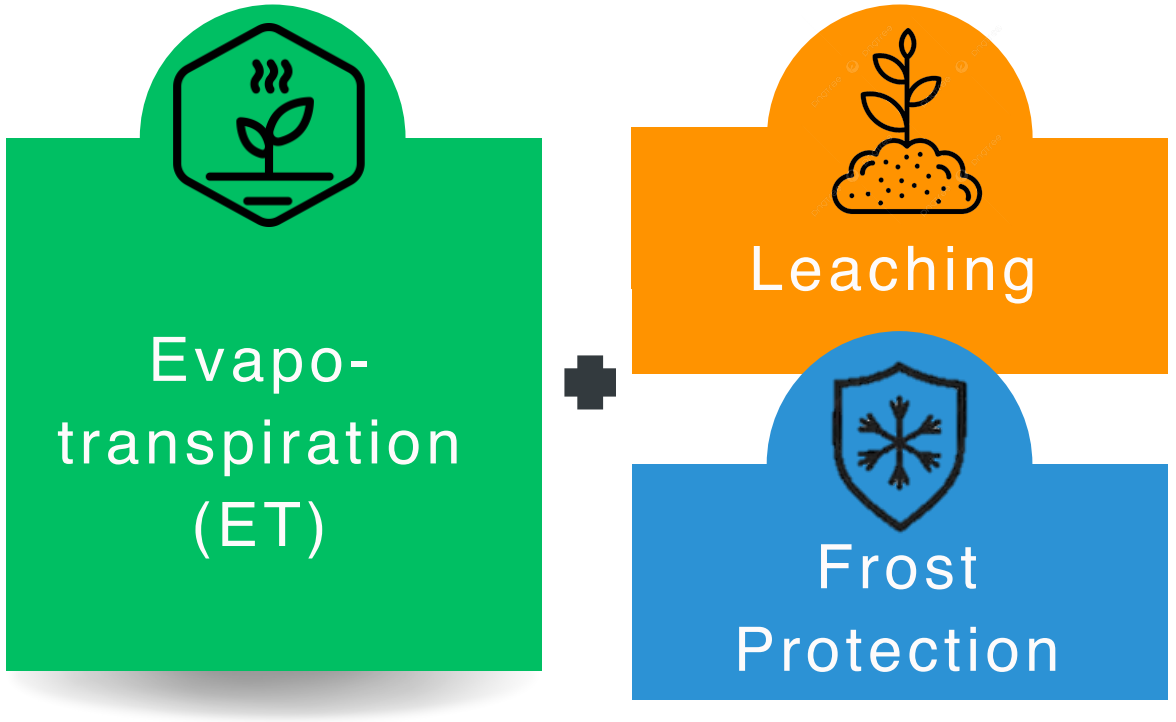
- Temperature
- Wind
- Soil Moisture
- Solar Radiation
- Region / Altitude

ET = Crop water needs

CROP/IRRIGATION REQUIREMENT

Crop Requirement: Amount of water supplied by irrigation to satisfy crop needs in terms of evapotranspiration

Irrigation requirement = crop + other requirements



IRRIGATION EFFICIENCY

Volume of water applied to the crop compared to the volume of water required by the crop for its irrigation requirement.

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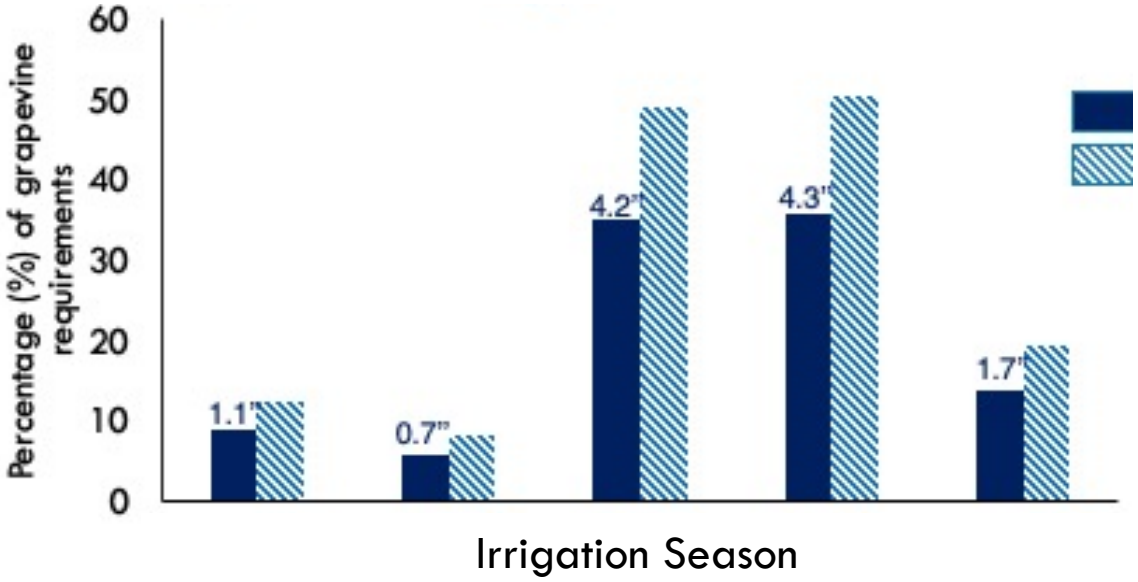


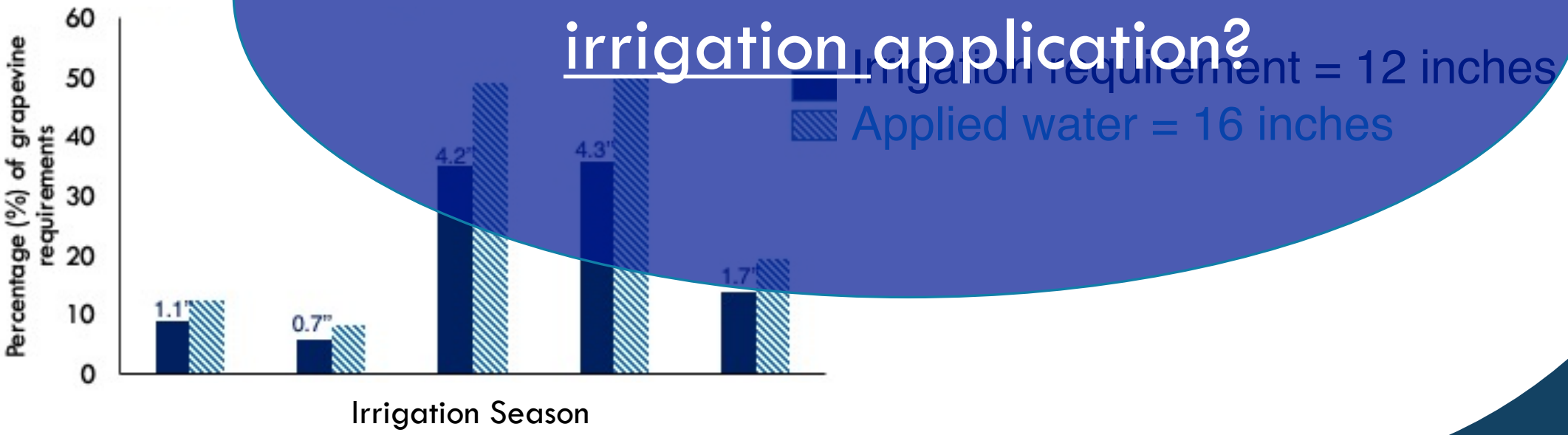
Crop requirement = 12 inches

Applied water = 16 inches

IRRIGATION EFFICIENCY

Volume of water applied to the crop compared to the volume of water required by the crop for its irrigation requirement.

How efficient was our irrigation application?



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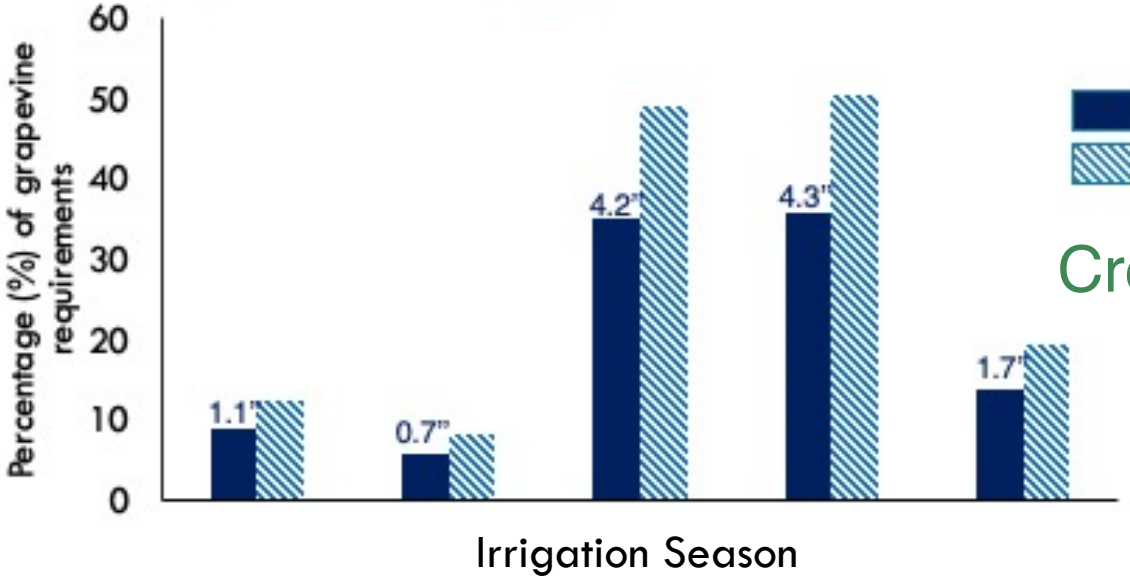


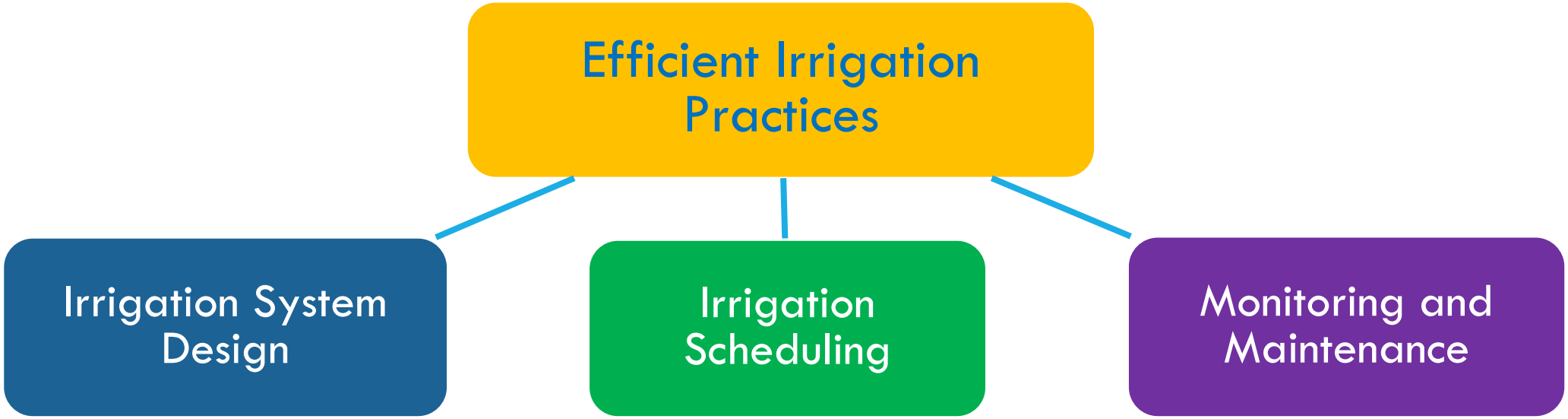
Crop requirement = 12 inches

Applied water = 16 inches

$$\text{Crop Irrigation efficiency} = \frac{12\ inches}{16\ inches}\ x\ 100$$

$$= 75\%$$

EFFICIENT IRRIGATION PRACTICES



Efficient Irrigation Practices

- Irrigation System Design
- Irrigation Scheduling
- Monitoring and Maintenance

Irrigation Systems

Surface

Application efficiency: 50 – 75%

Sprinklers

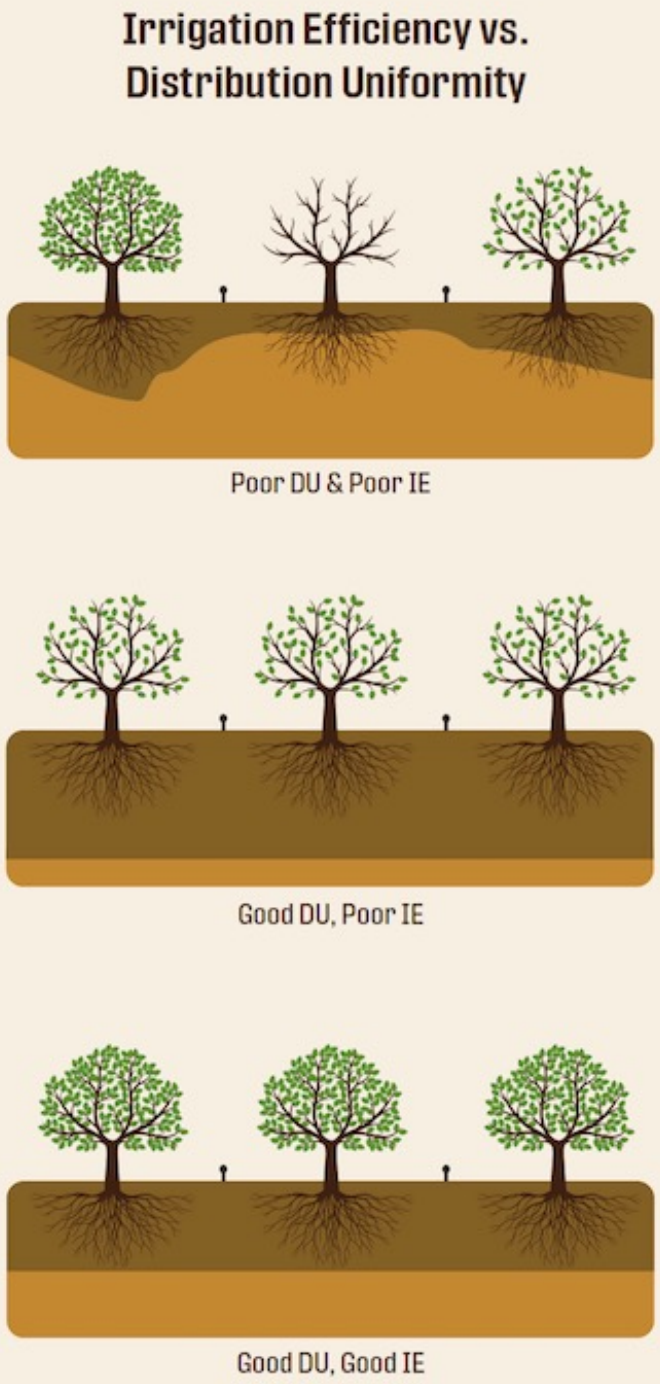
Application efficiency: 70 – 90%

Microirrigation

Application efficiency: 85 – 95%

Factors to think about:

- natural conditions
- type of crop
- type of technology
- previous experience
- required labor inputs
- costs and benefits.



Distribution Uniformity

Distribution Uniformity (DU) measures how well irrigation water and fertigation is distributed to different areas in the field.

How to achieve good DU and good IE

- Monitor drip emitter flow rates
- Check pressure at the pump and drip hoses
- Replace plugged emitters or damaged hoses.
- Evaluate DU every 3 to 5 years

Irrigation Scheduling

Irrigation scheduling involves planning when and how much water to apply

Soil-based

Weather ET-based

Irrigation Scheduling

Soil-based

Assessing the moisture content in the soil

It's important to understand the soil water content at which a crop begins to experience stress.

Types of soil moisture sensors:

1) **Volumetric:** measure water content
2) **Tension:** measure soil tension when placed in the soil profile.

Irrigation Scheduling

Weather ET-based

Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$

Evapotranspiration of my crop = is my crop water needs

Irrigation Scheduling

Weather ET-based

Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$

Reference ET is the water needs of grass

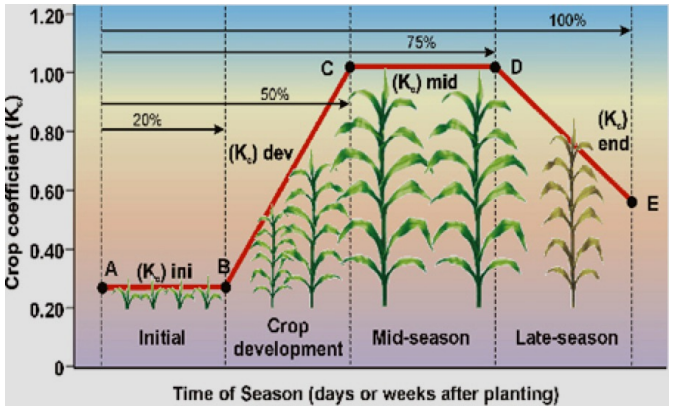
Irrigation Scheduling

Weather ET-based

Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$

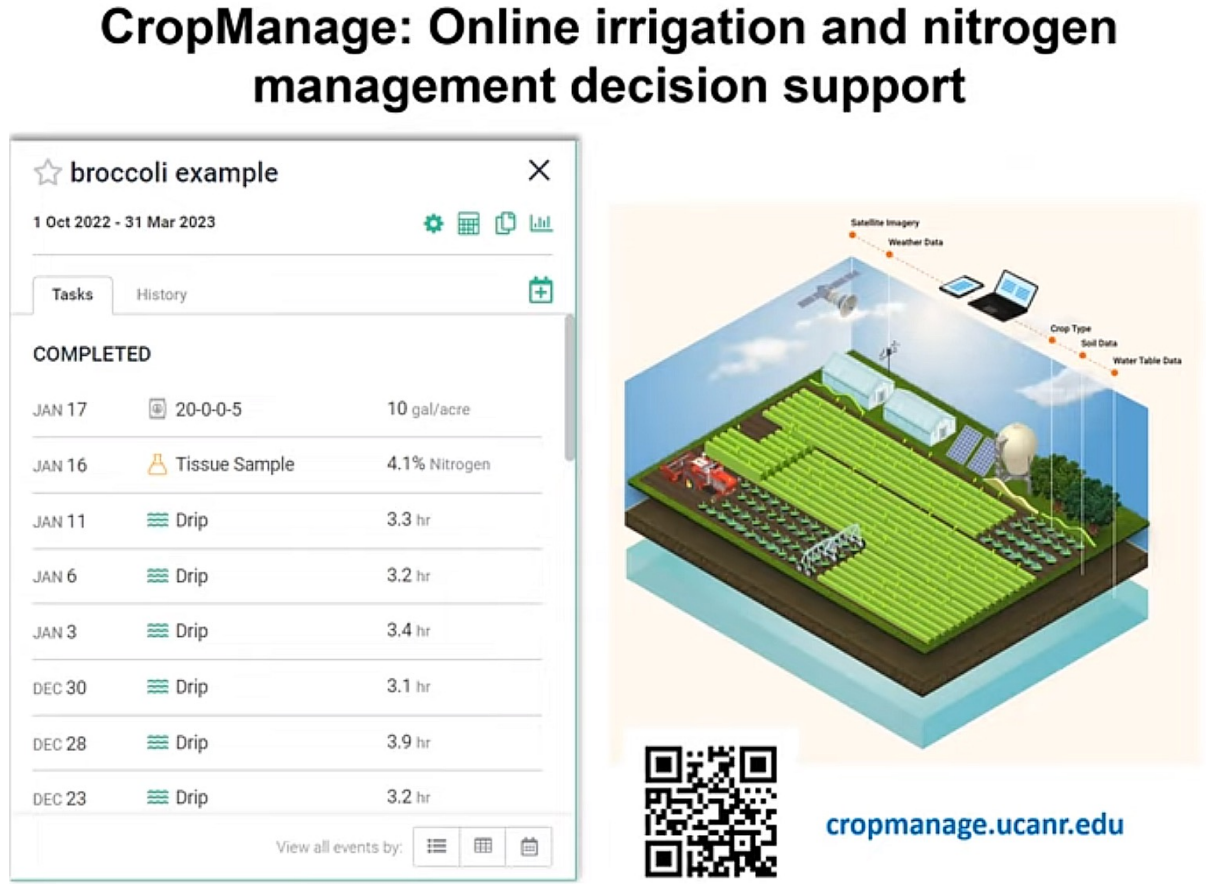
Kc is the crop coefficient. It represents the integrated changes in plant development



Date	K_c (W. Gape)
Mar 16-31	0.32
Apr 1-15	0.41
Apr 16-30	0.50
May 1-15	0.59
May 16-31	0.69
June 1-15	0.78
Jun 16-31	0.82
July 1-15	0.82
July 16-31	0.82
Aug 1-15	0.82
Aug 16-31	0.77
Sep 1-15	0.66
Sep 16-30	0.55
Oct 1-15	0.44

Crop Coefficient Values of Wine Grapes (UC Cooperative Extension)

Irrigation Scheduling Tools



Irrigation Scheduling

Weather ET-based

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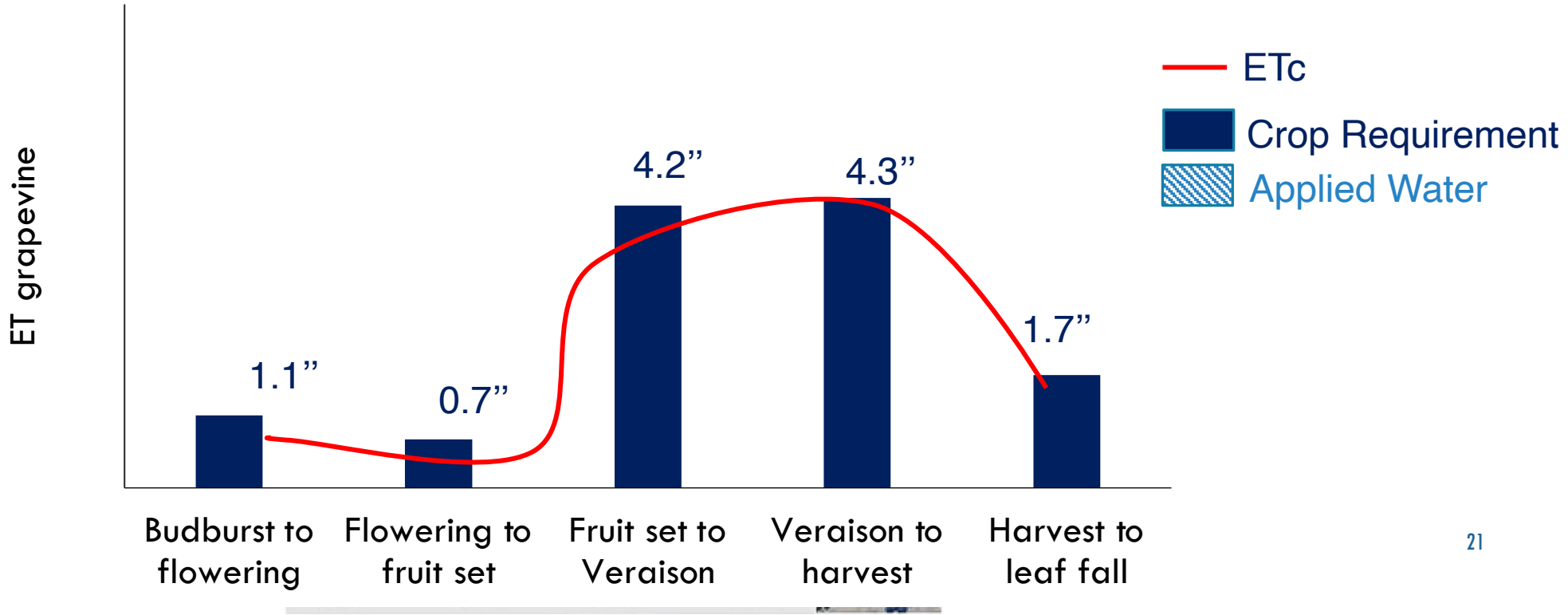


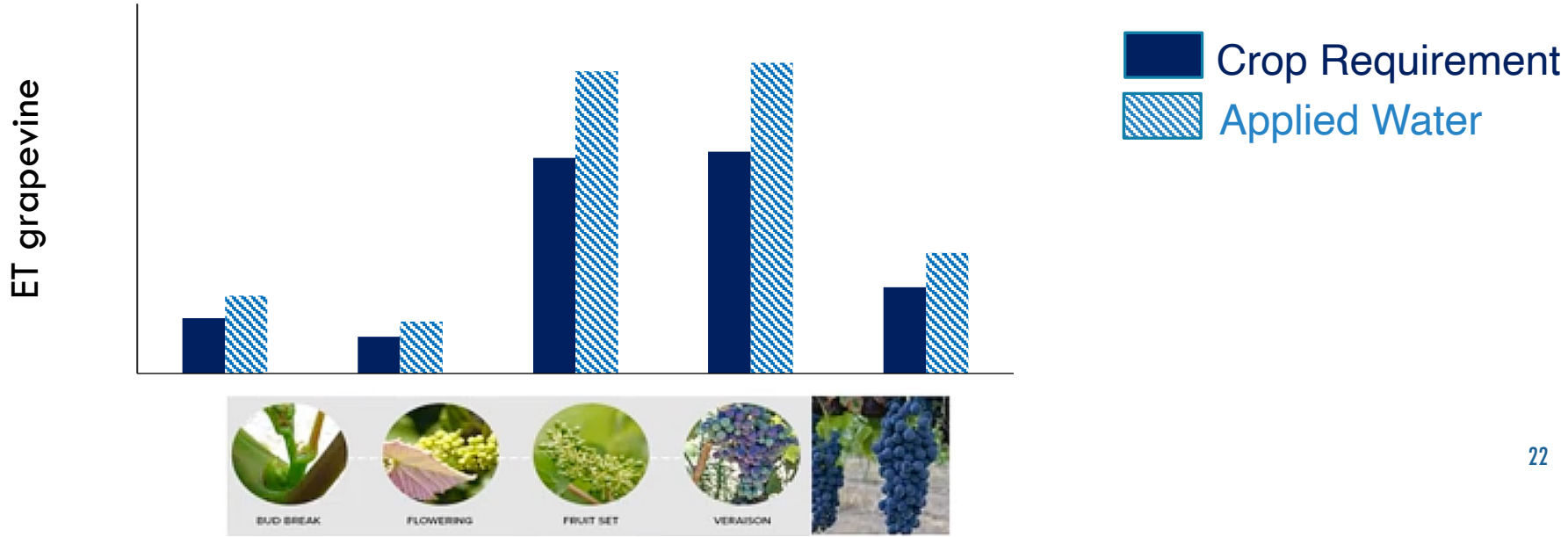
Irrigation Scheduling

Weather ET-based

Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$

Crop requirement is 12" but initially we applied 16"



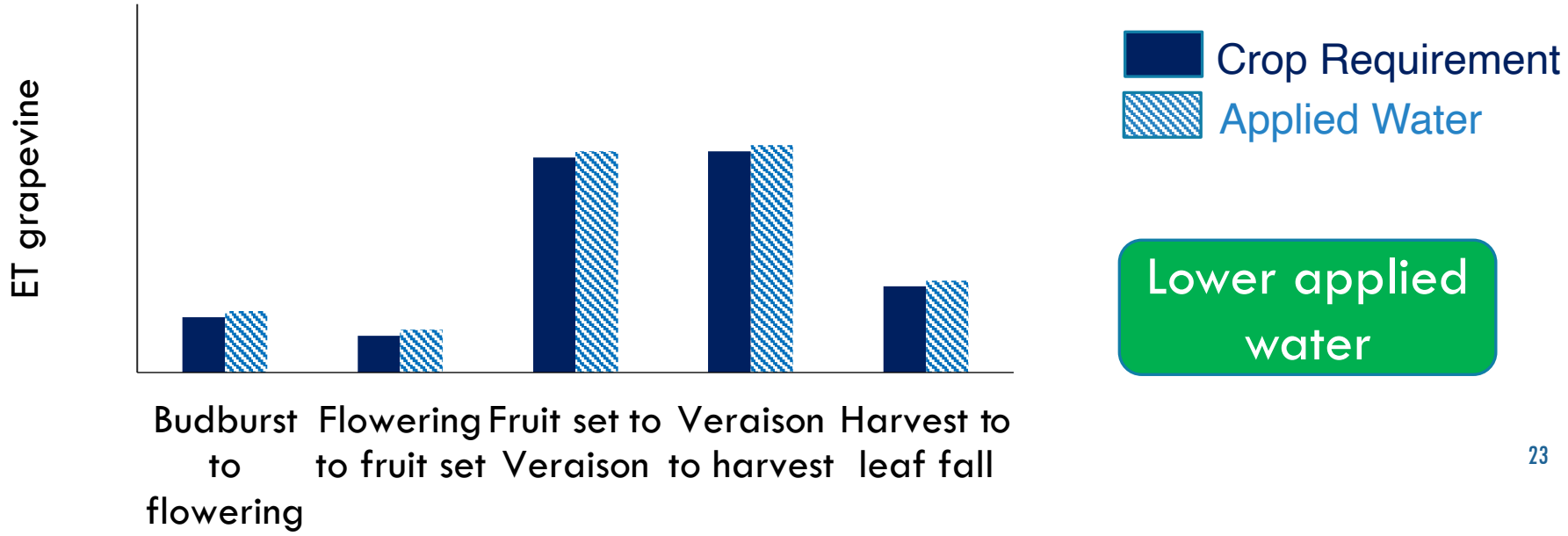
Irrigation Scheduling

Weather ET-based

Crop water Needs

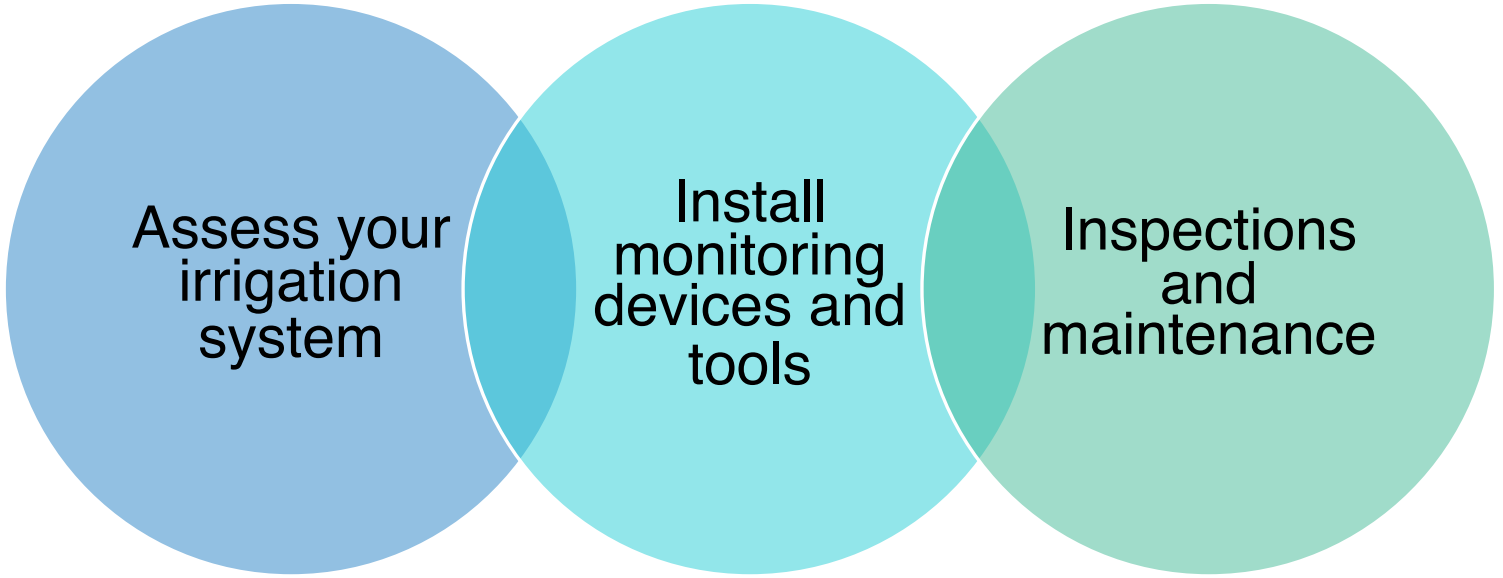
$$ET_{crop} = ET_{ref} \times K_{crop}$$

by using irrigation scheduling we can lower the applied water closer to 12”



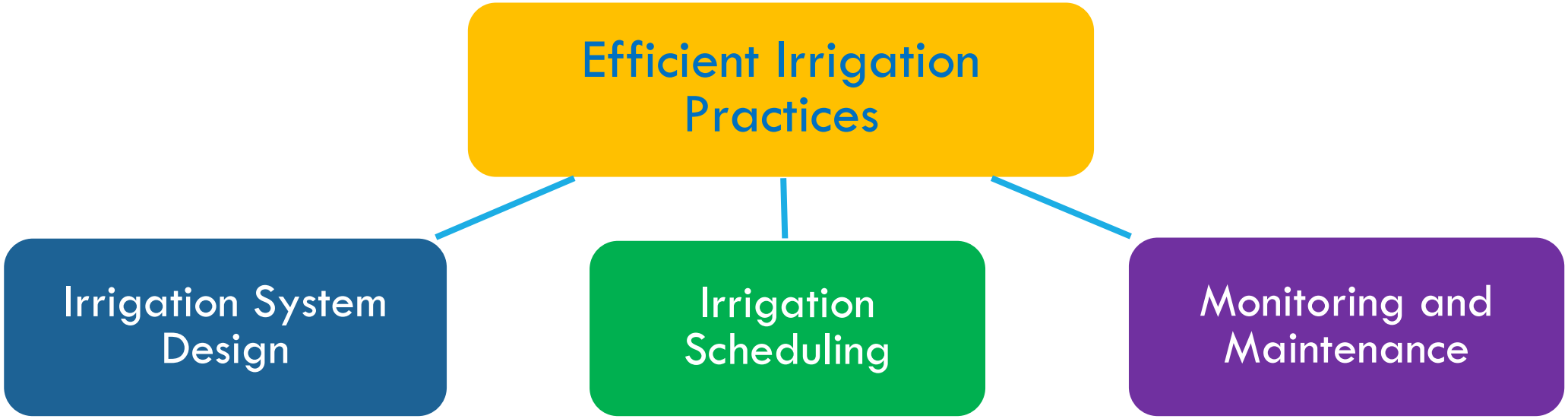
Lower applied water

Monitoring and Maintenance



EFFICIENT IRRIGATION PRACTICES

SUMMARY



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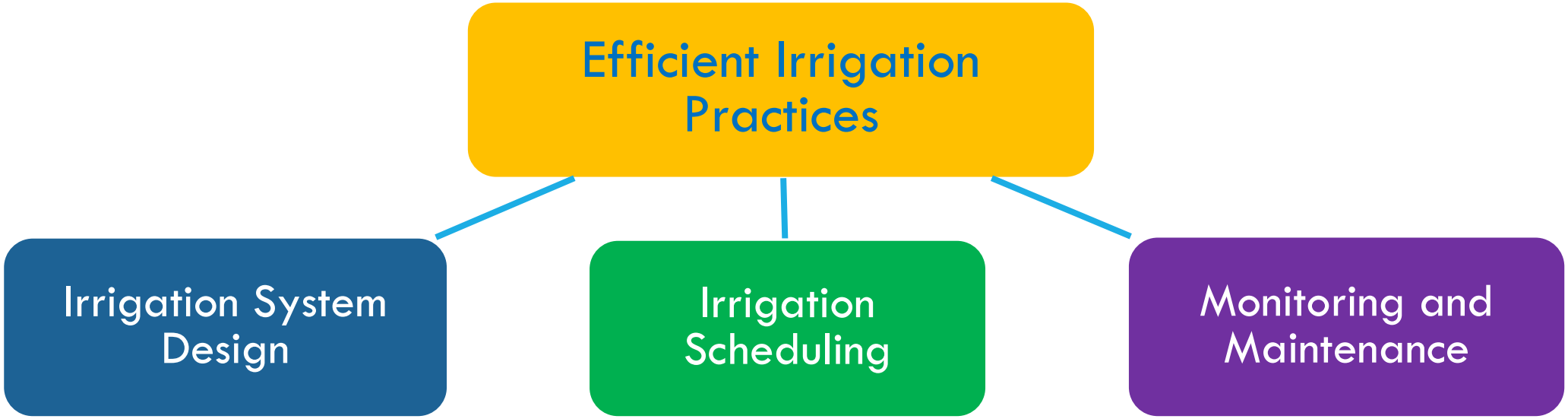

Selecting the appropriate irrigation system will enhance the application uniformity of your irrigation. Allowing more control over your field and the inputs applied.

EFFICIENT IRRIGATION PRACTICES

SUMMARY

Efficient Irrigation Practices

Irrigation System Design

Selecting the appropriate irrigation system will enhance the application uniformity of your irrigation. Allowing more control over your field and the inputs applied.

Irrigation Scheduling

Deciding when and how much to irrigate will:

- Achieve high irrigation efficiency
- Maximize yields
- Save water and fertilizer
- Reduce labor and costs

Monitoring and Maintenance

EFFICIENT IRRIGATION PRACTICES

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Monitoring and Maintenance

Tools such as flowmeters, soil moisture sensors and regular check ups and inspections provide real-time data allowing the grower to make informed decisions.

Efficient Irrigation Practices

Irrigation System Design

Irrigation Scheduling

Monitoring and Maintenance

BENEFITS OF EFFICIENT IRRIGATION

- Increase yields
- Conserve Water
- Minimize nutrient loss
- Reduced costs
- Drought Adaptation

THANK YOU!

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