ENHANCING THE CONTRIBUTION OF ISOTOPIC TECHNIQUES TO THE EXPANSION OF PRECISION IRRIGATION

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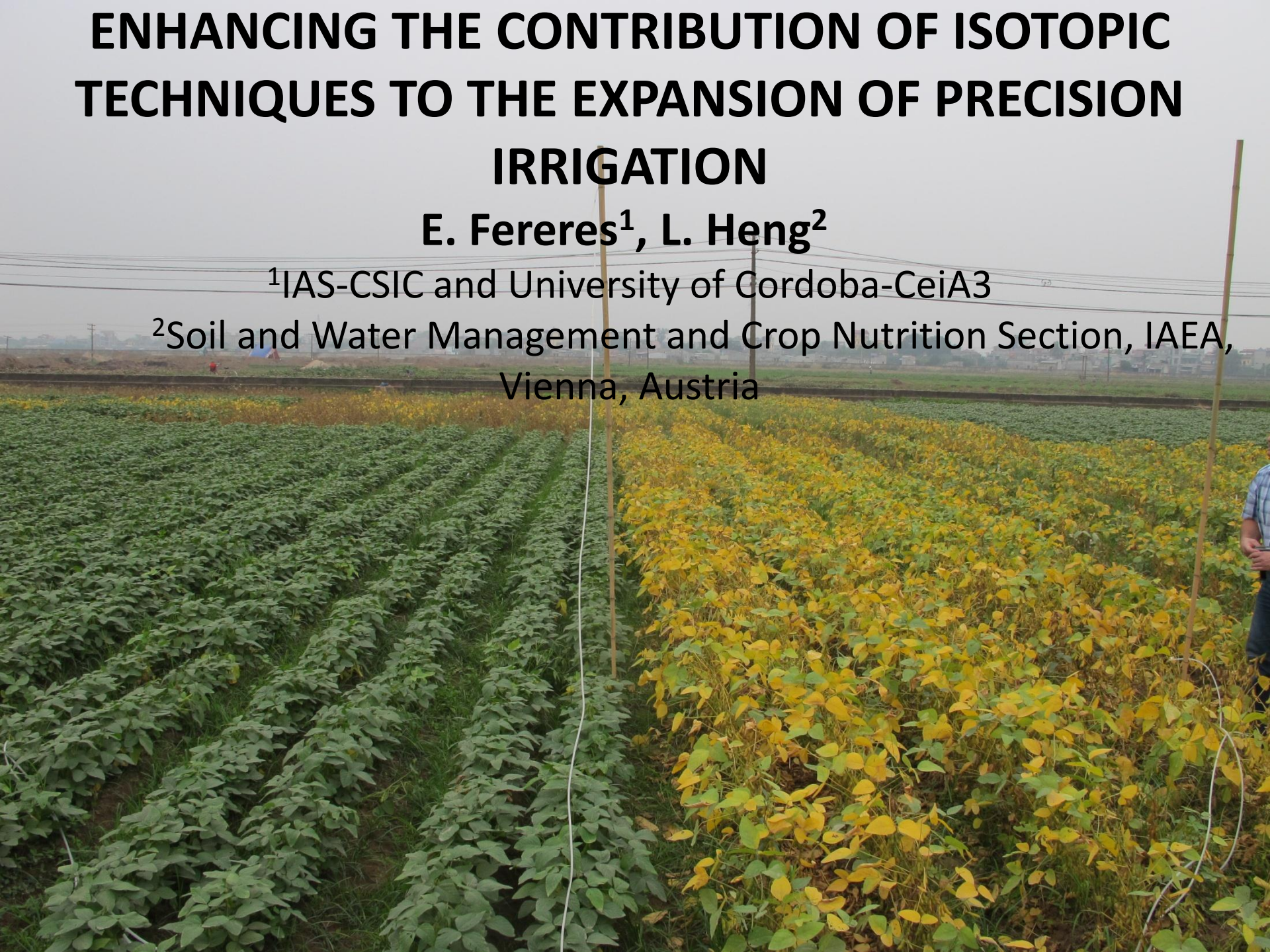
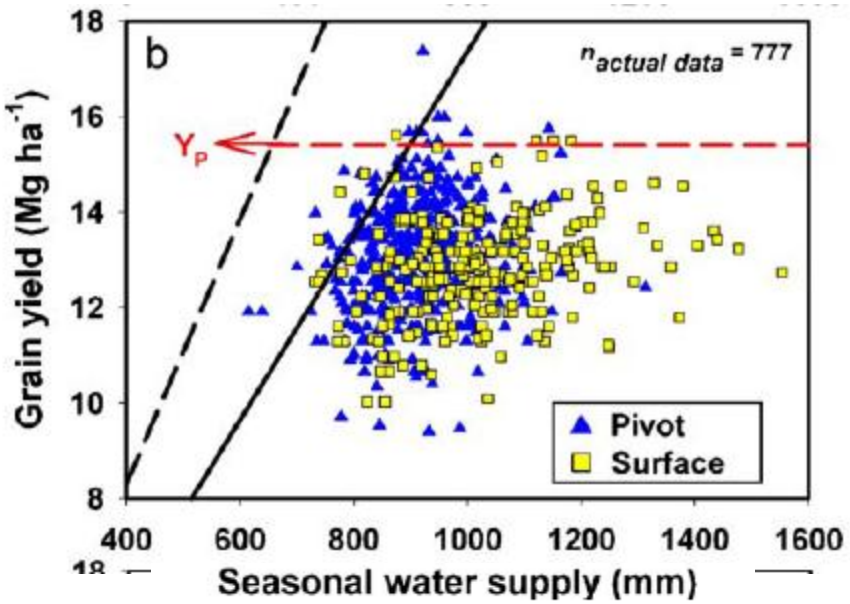
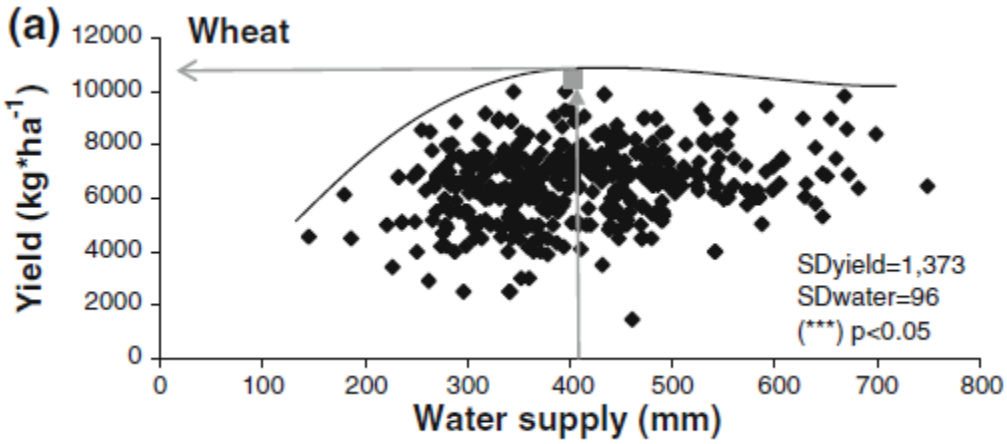


THE YIELD GAP IN IRRIGATED AGRICULTURE

Maize, Nebraska, USA, Grassini et al.,(2011)



Albacete, Spain, Montoro & Fereres, (2011)



Opportunities for Improving Productivity and Reducing Water Use in Irrigation

1. Change irrigation method
2. Improved management and scheduling
3. Precise estimation of water requirements

ALL OF THESE ARE COMPONENTS OF PRECISION IRRIGATION

We Must Reduce Water Consumption (ET)

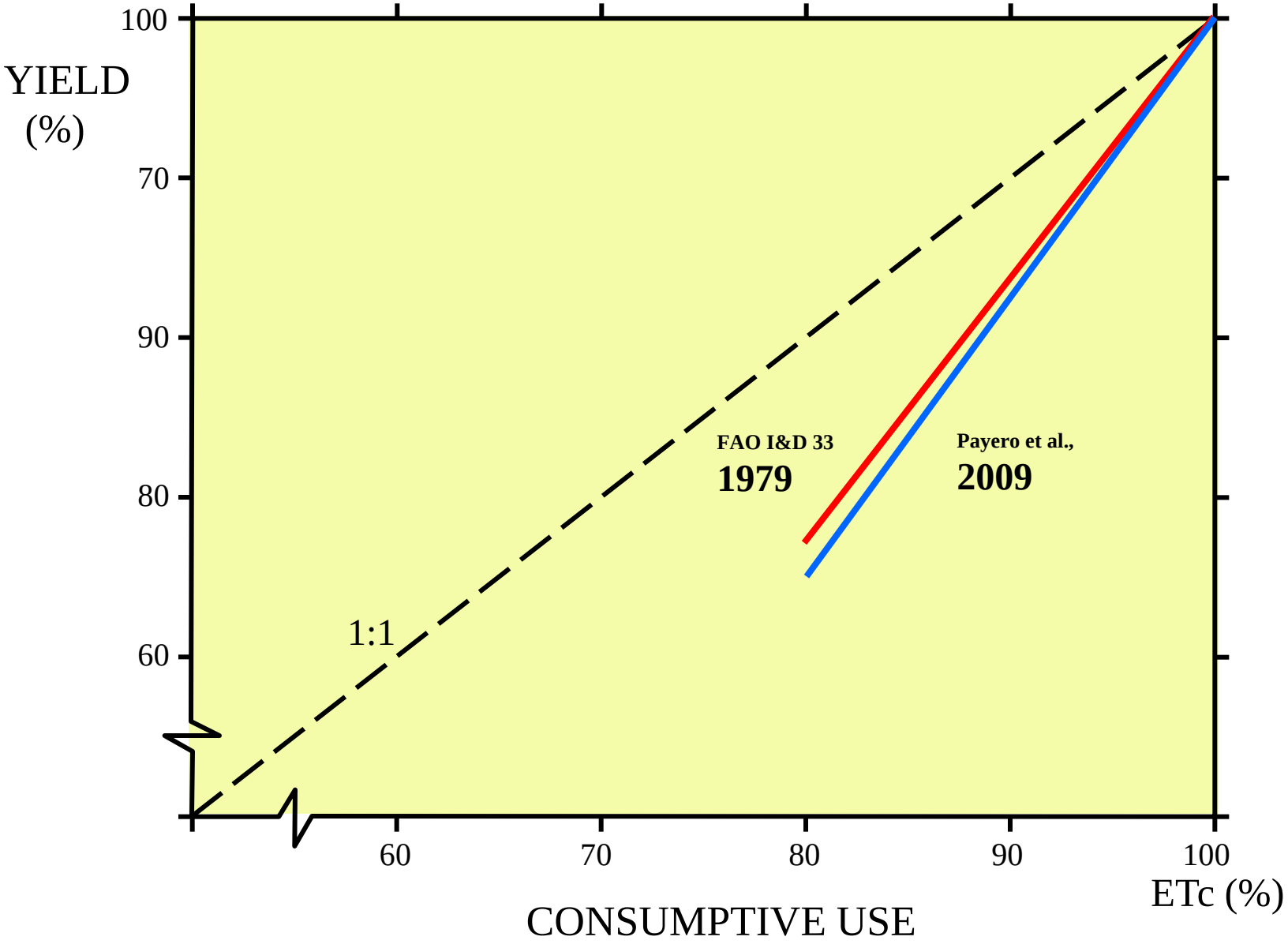
Therefore decrease

E and/or T

Can we Reduce Transpiration?

BREED DROUGHT RESISTANT CROPS

MAIZE WATER PRODUCTION FUNCTION



THE RECENT SEARCH FOR GENETIC DROUGHT TOLERANCE IN CROPS

TWENTY YEARS OF INVESTMENTS ON THE MOLECULAR BIOLOGY OF PLANT SURVIVAL UNDER DROUGHT, WITH SPECTACULAR ANNOUNCEMENTS OF FINDINGS THAT NEVER MATERIALIZED.

SKIRYCZ A. et al., 2011: SURVIVAL AND GROWTH OF ARABIDOPSIS PLANTS GIVEN LIMITED WATER ARE NOT EQUAL. NATURE BIOTECH. 29, 212

Genetic traits associated with drought tolerance that have positive effects in some environments have negative effects in others.

DROUGHT TOLERANCE IS THE RESULT OF GENOTYPE X ENVIRONMENT X MANAGEMENT INTERACTIONS!

LET'S TURN TO THE EVAPORATION LOSSES FROM SOIL

How much E represents of ETc?

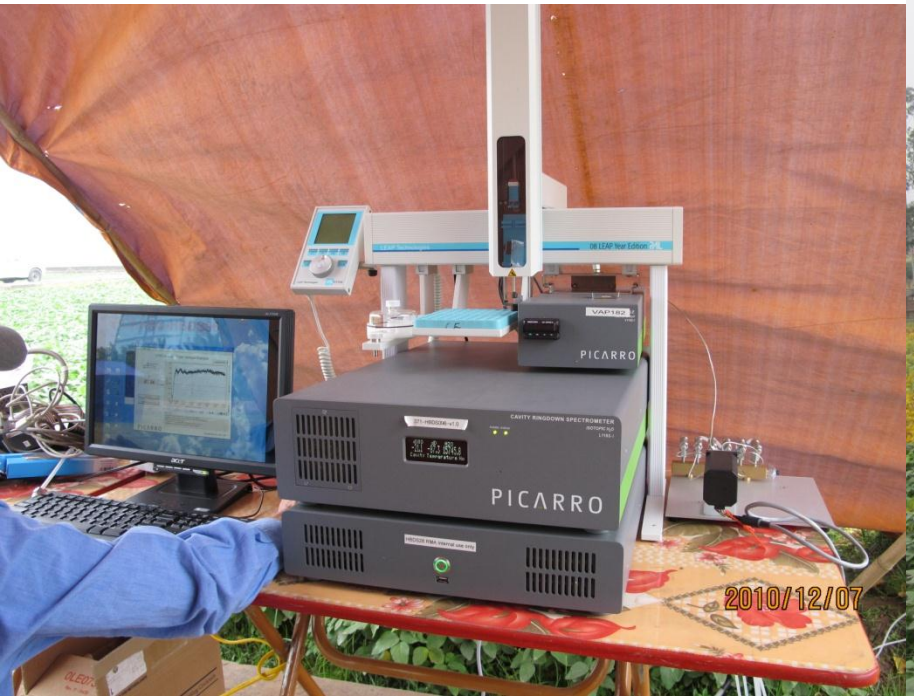
HOW MUCH CAN BE SAVED?

Photo Courtesy, Dr. D. Goldhamer

SOME IMPORTANT APPLICATIONS OF ISOTOPES

CAN WE SEPARATE E FROM T?

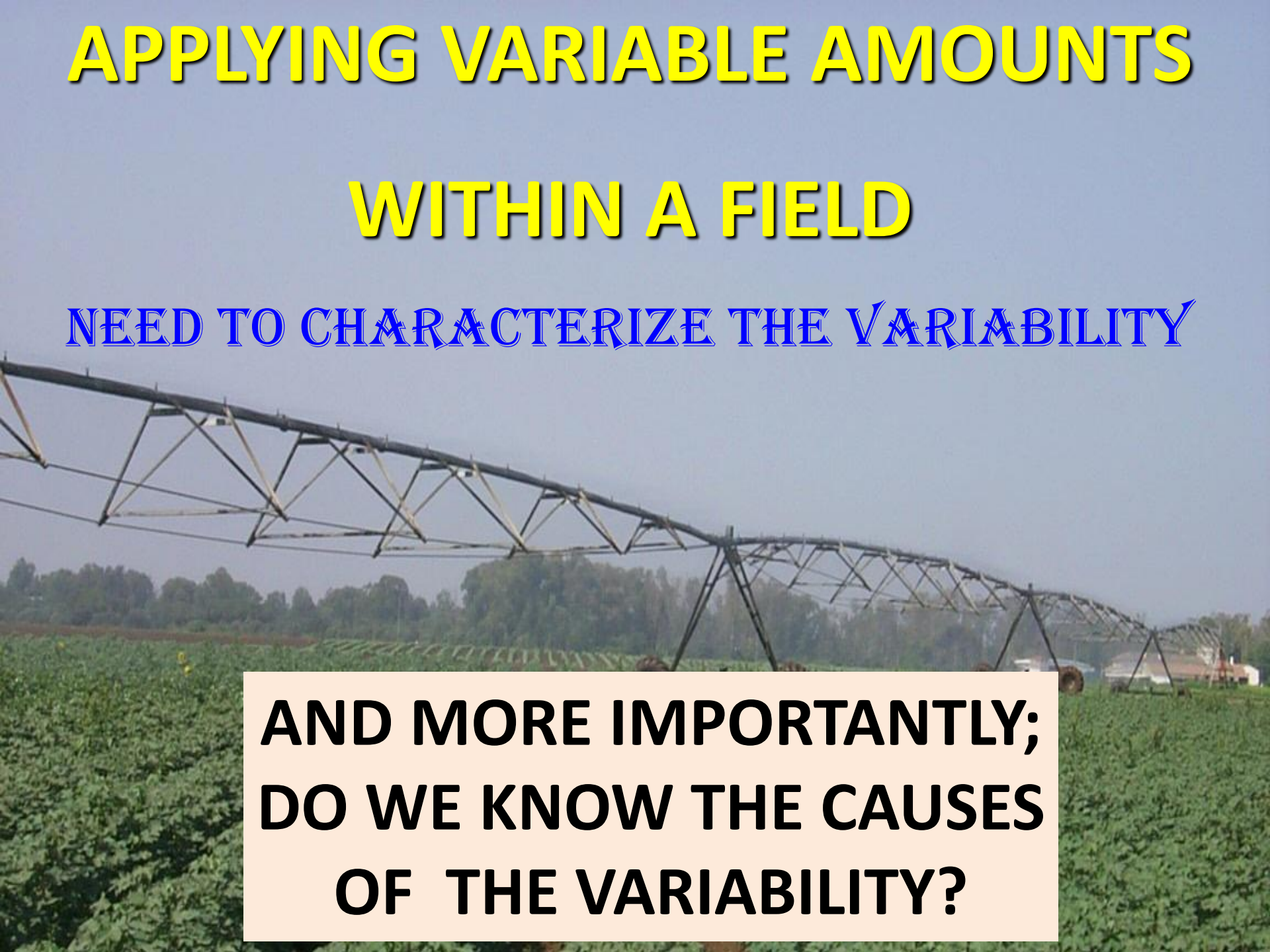
- **Isotopic composition of T is much heavier than isotopic composition of E**
- **Laser-based, portable isotope analyzer**




Precision irrigation?
dealing with spatial variability

APPLYING VARIABLE AMOUNTS WITHIN A FIELD

NEED TO CHARACTERIZE THE VARIABILITY

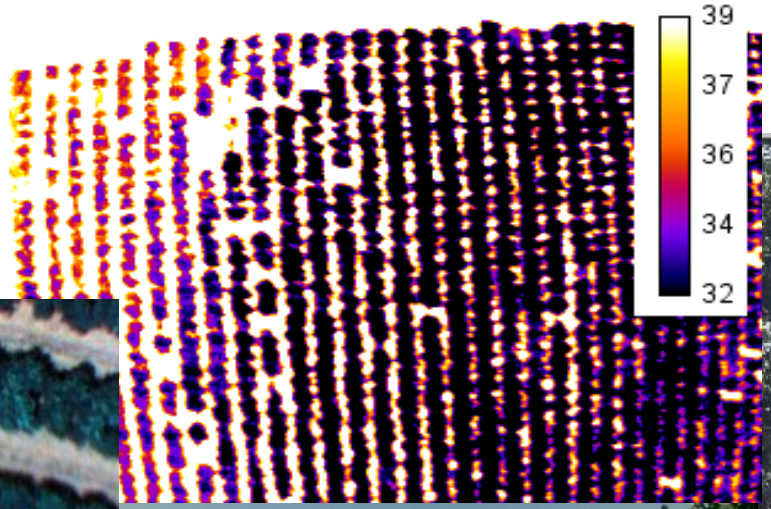


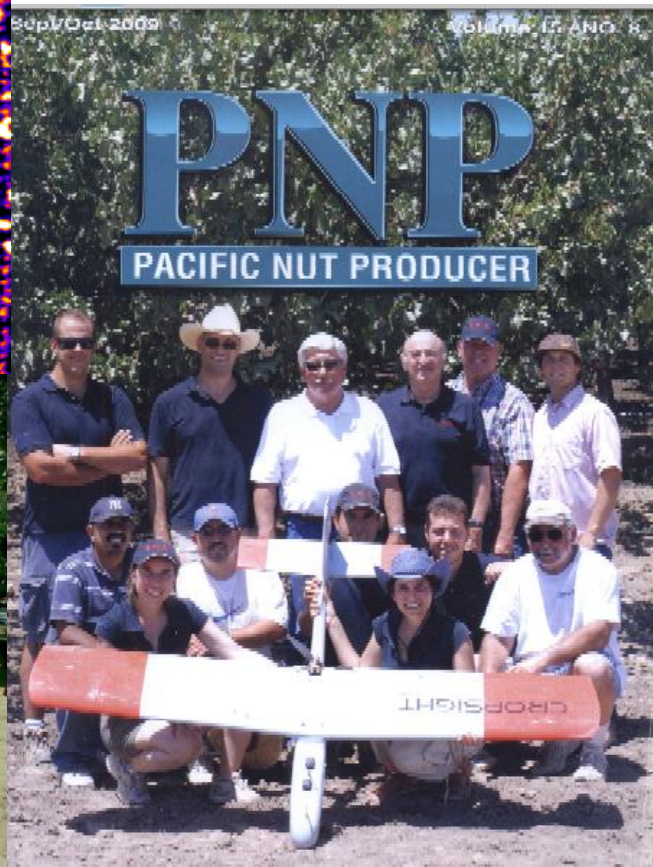
AND MORE IMPORTANTLY; DO WE KNOW THE CAUSES OF THE VARIABILITY?


CHANGE THE
SCALE
OFOBSERVATION

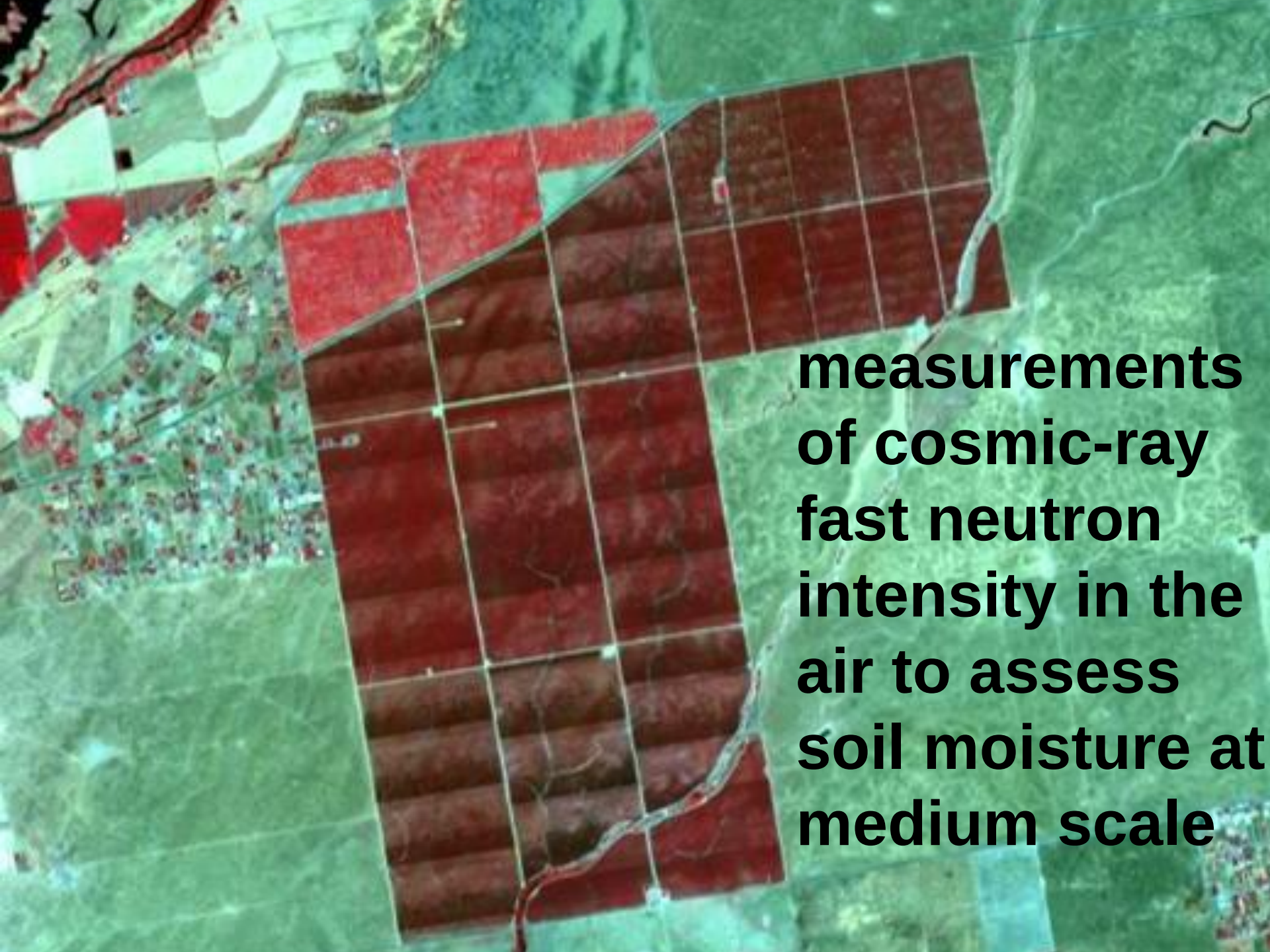
IMPROVING MANAGEMENT VIA PRECISION IRRIGATION

DEVELOPMENT OF A REMOTE SENSING PLATFORM FOR IRRIGATION SCHEDULING





Maps of crop water status to assist in precision irrigation for management and re-engineering


measurements
of cosmic-ray
fast neutron
intensity in the
air to assess
soil moisture at
medium scale


THANK YOU