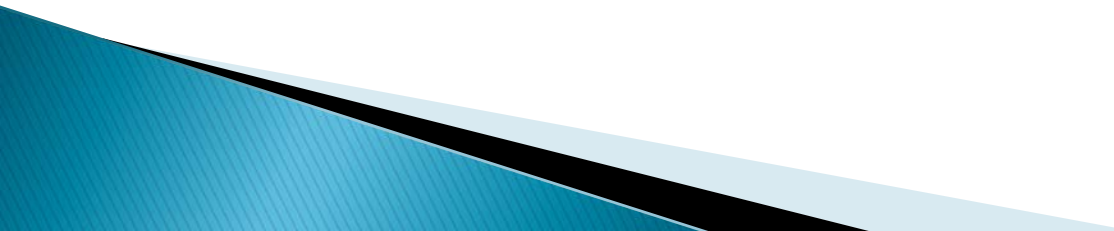


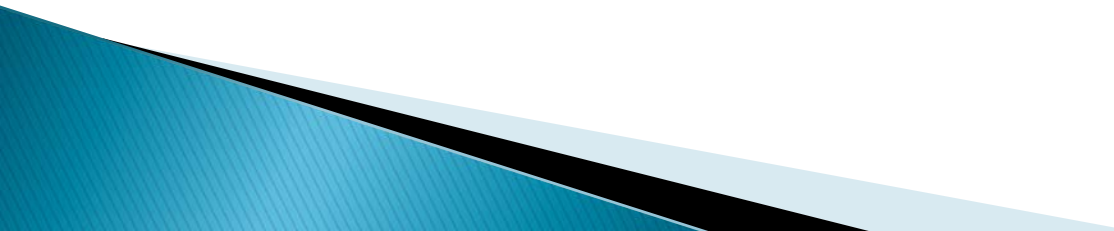
NITROGEN CYCLE

**DAN HINRICHS
DJH ENGINEERING
APRIL 15, 2009**

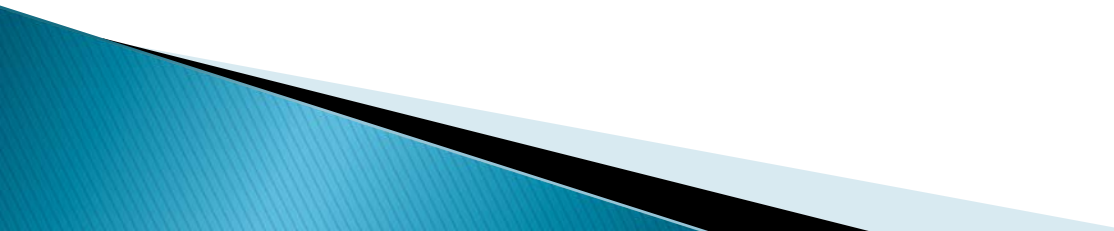
SIGNIFICANCE

- ▶ WHAT IS THE SIGNIFICANCE OF THE NITROGEN CYCLE?
 - ▶ NECESSARY TO OPTIMIZE EFFICIENCY OF NITROGEN FERTILIZER
 - ▶ LOST NITROGEN IS WASTED COST
 - ▶ LOST NITROGEN BECOMES A CONTAMINANT IN WATER
- 

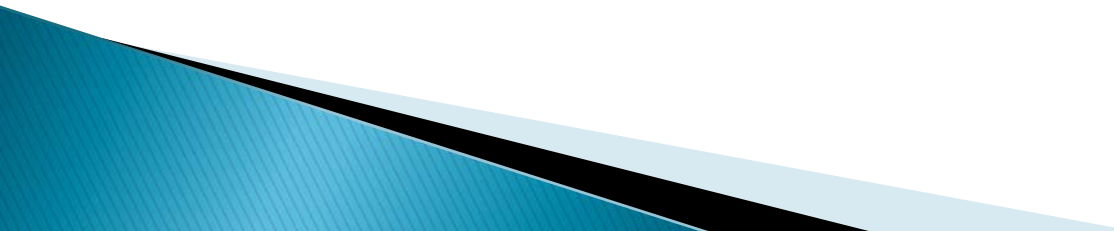
NITROGEN SOURCES

- ▶ FERTILIZER
 - ▶ MANURE
 - ▶ NITROGEN FIXING
 - ▶ ANIMAL EXCRETION
 - ▶ ATMOSPHERIC DEPOSITION
- 

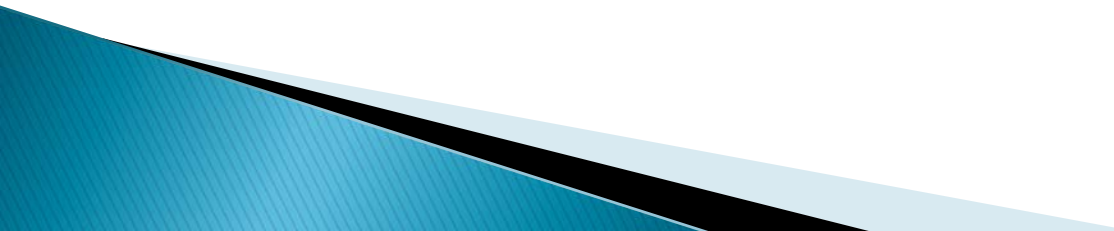
NITROGEN REMOVAL/LOSSES

- ▶ CROP HARVEST
 - ▶ GRAZING ANIMAL GROWTH
 - ▶ IMMOBILIZATION (USED LATER)
 - SOIL ORGANIC MATTER
 - METALLO/ORGANIC AND ORGANO/CLAY COMPLEXES
 - ▶ DENITRIFICATION
 - ▶ LEACHING AND RUNOFF
- 

IMMOBILIZATION

- ▶ KEY TO UNDERSTANDING NITROGEN BALANCE AND OPTIMUM CROP PRODUCTION
 - ▶ NITROGEN TAKEN UP BY BACTERIA FOR CELL GROWTH - C:N RATIO
 - ▶ CAN BE LATER RELEASED
 - ▶ ORGANIC MINERALIZATION AND NITRIFICATION FUNCTIONS OF MOISTURE, OXYGEN, SOIL CONDITIONS
- 

CROP UPTAKE

- ▶ NITRATE AND AMMONIA – USABLE FORMS
 - FERTILIZER
 - MINERALIZATION (AMMONIFICATION)
 - NITRIFICATION
 - ▶ OPTIMIZATION – MATCHING CROP NEED WITH APPLICATION AT THE RIGHT TIME
- 

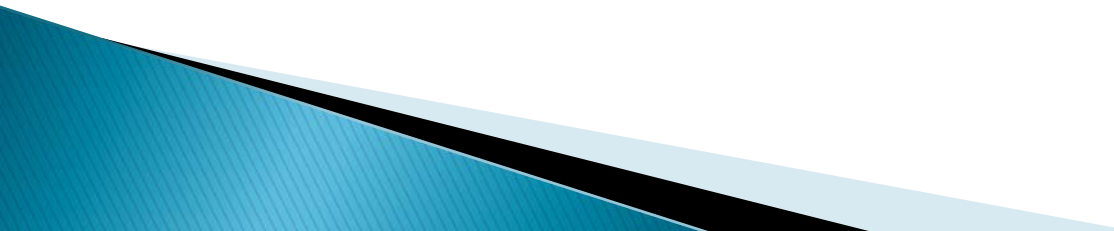
CROP UPTAKE

- ▶ FUNCTION OF:
 - BALANCE WITH OTHER NUTRIENTS, MICRONUTRIENTS, TRACE ELEMENTS
 - MOLYBDENUM – CATALYST FOR NITROGEN UPTAKE
 - STAGE OF CROP GROWTH
 - CROP TYPE
 - YIELD

ORGANIC FERTILIZERS/MANURE

- ▶ NEED TO UNDERSTAND MINERALIZATION RATE
- ▶ HOW MUCH IS AVAILABLE AND WHEN?
 - YEAR 1 – 25–40%
 - YEAR 2 – 20–25%
 - YEAR 3 – 10–15%
 - YEAR 4 – 5–10%
 - YEAR 5 – 5–10%

REFERENCES

- ▶ SOIL FERTILITY AND FERTILIZERS – TISDALE AND NELSON, 3RD EDITION, 1975
 - ▶ WESTERN FERTILIZER HANDBOOK, EIGHTH EDITION (NINTH EDITION AVAILABLE), CALIFORNIA PLANT HEALTH ASSOCIATION
 - ▶ SOIL MICROBIOLOGY, ECOLOGY, AND BIOCHEMISTRY, E. A. PAUL, EDITOR, 3rd EDITION, ACADEMIC PRESS
- 

SUMMARY

OPTIMIZATION OF NITROGEN FERTILIZER

=

MINIMIZATION OF NITROGEN LOST TO THE
WATER ENVIRONMENT

