

N Fertilizer Applications

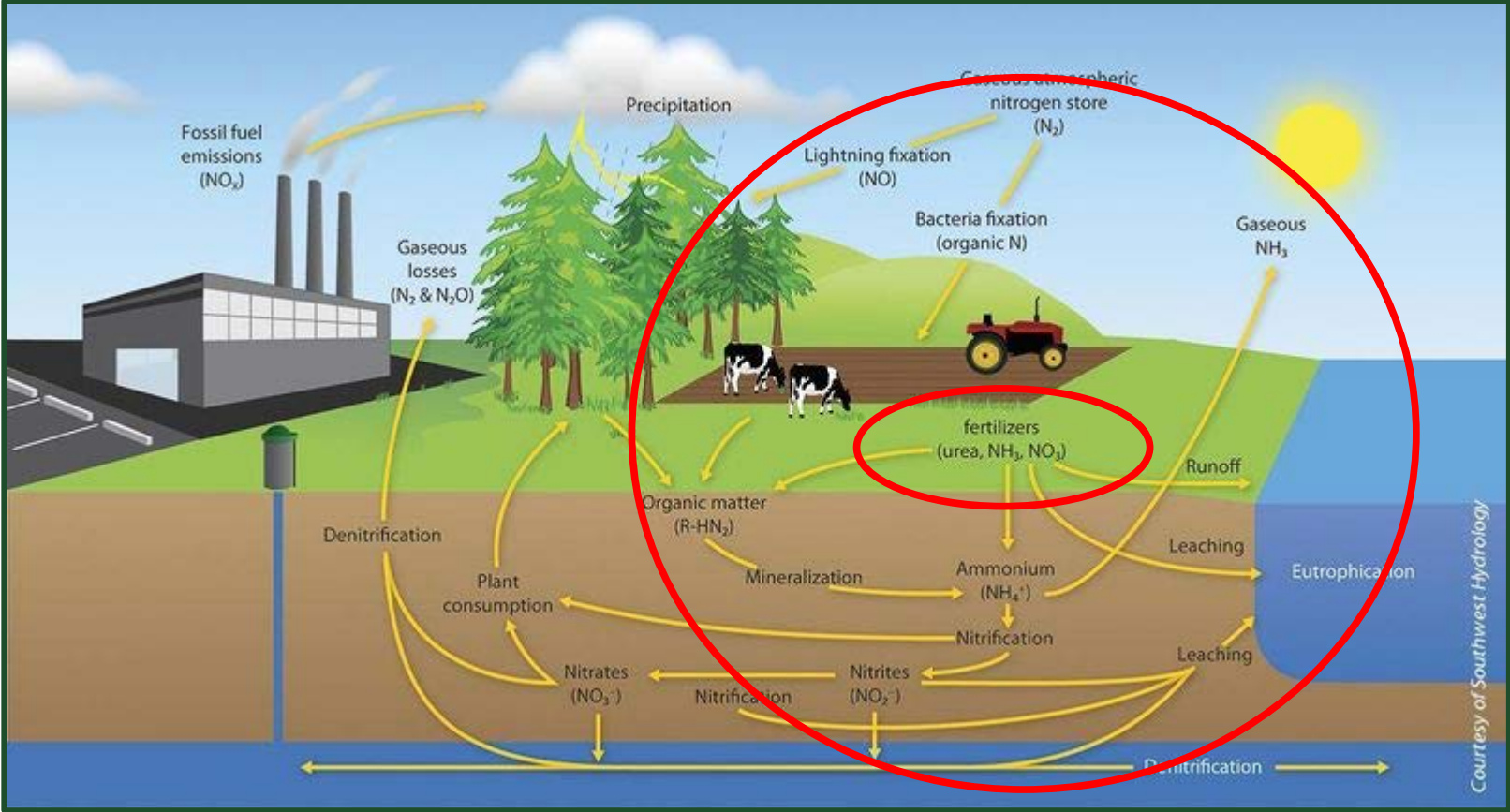
Timing Considerations
Overview of Research Trials

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RESEARCH CENTER**
COLORADO STATE UNIVERSITY

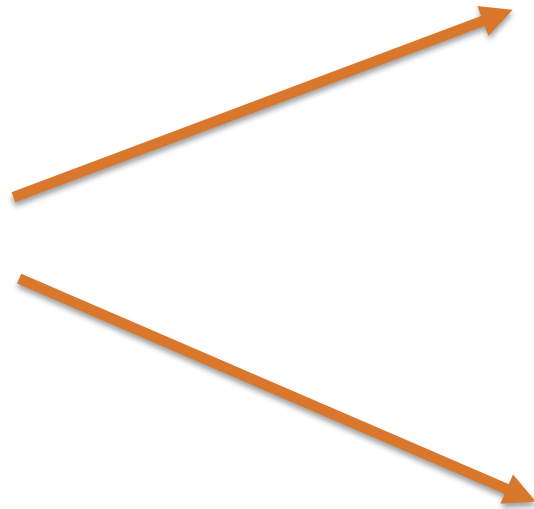
Nitrogen Cycle:



Source: UC Davis

Nutrient Management

- **Right Source**
- **Right Time**
- **Right Rate**
- **Right Place**



- **Increase Production Goals**
- **Manage Input Costs**
- **Environmental Stewardship**
- **Regulatory Concerns**

N Loss

- **Nitrification** – Soil Temperature $>50^{\circ}\text{F}$ conversion to nitrate
- **Leaching** – Nitrate is water soluble, subsoil moisture recharge
- **Denitrification** – Saturation and temperature dependent
- **Volatilization** – Urea based fertilizer converts to gas, soil moisture and temperature dependent

Right Source:

Cropping System

Application Method

Availability

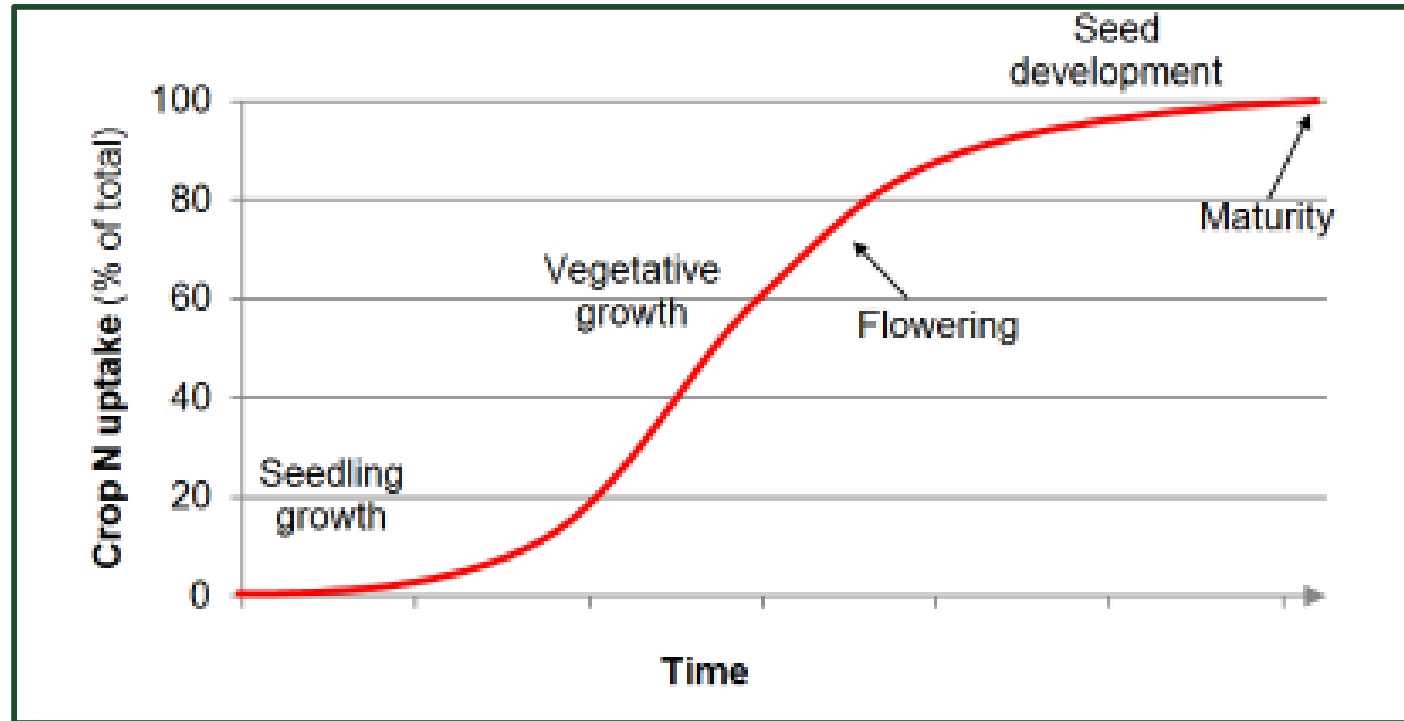
Management Practices



Sources of N Fertilizers:

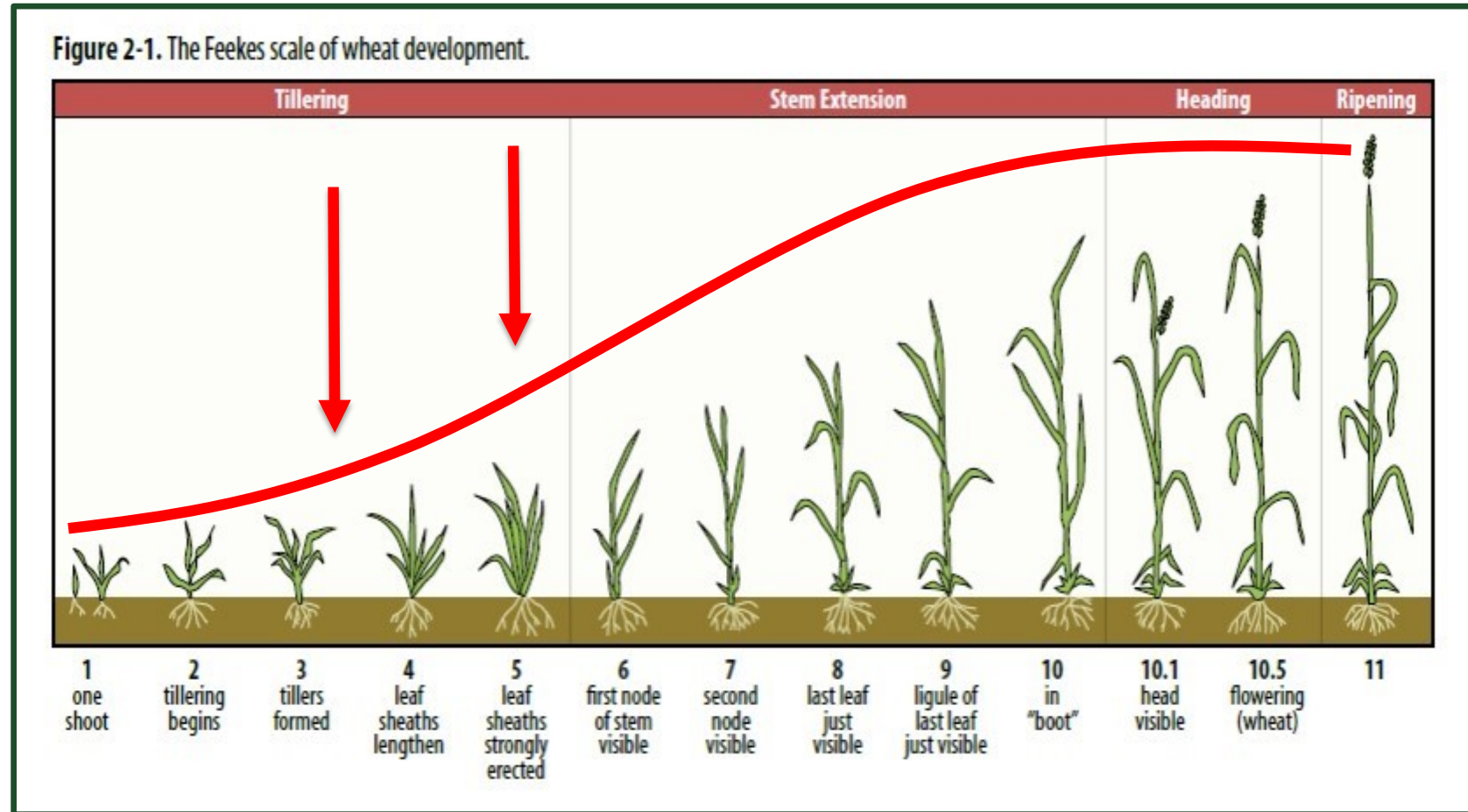
Fertilizer	%N	Formulation
Urea	46	Solid
Ammonium Nitrate	34	Solid
UAN	32	Liquid
Anhydrous Ammonia	82	Gas
Ammonium Sulfate	21	Solid
MAP	11	Solid

Right Time



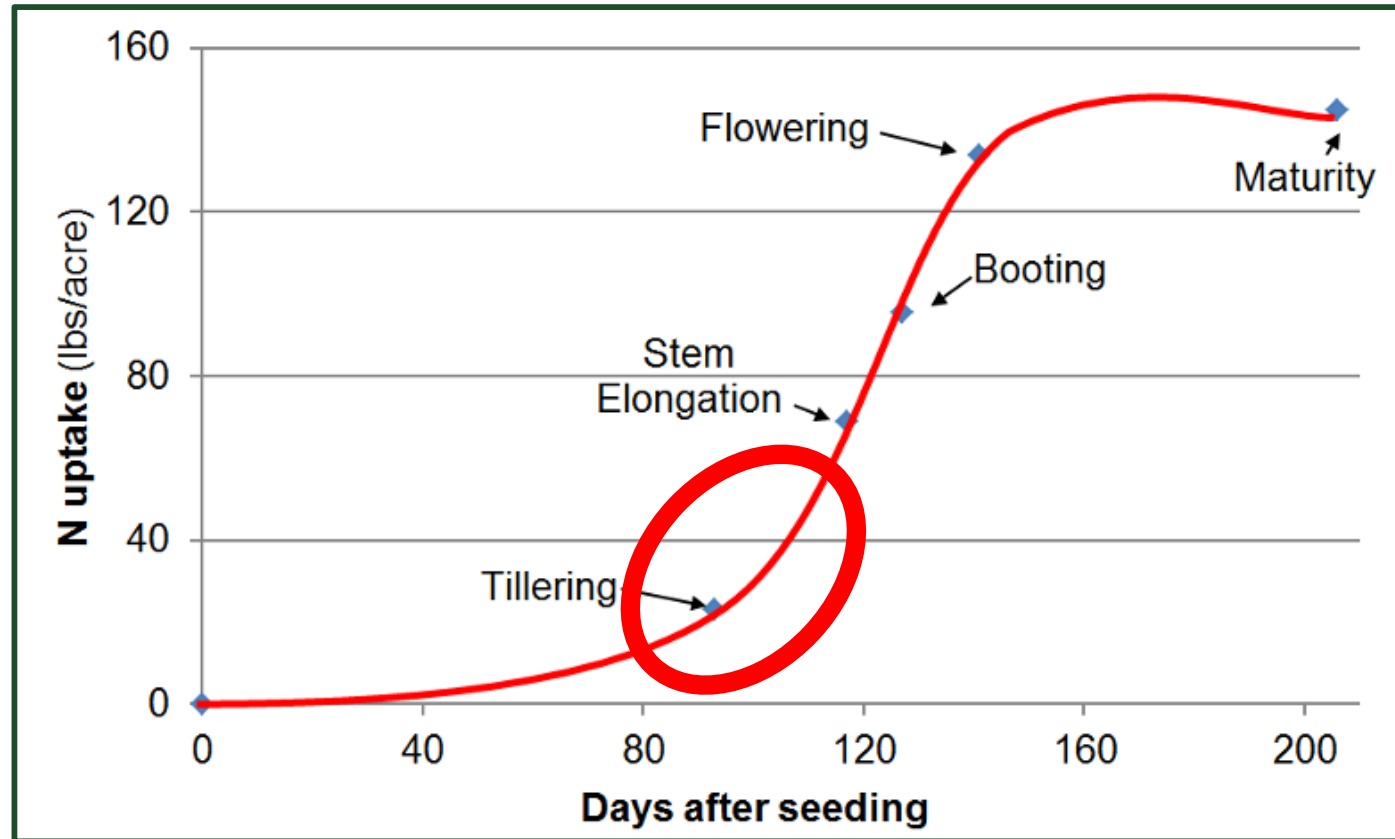
Source: UC Davis

Right Time



Source: <http://nwdistrict.ifas.ufl.edu>

Right Time



Source: UC Davis

Right Place

- Broadcasting
- Foliar
- Banding
- Fertigation
- Aerial

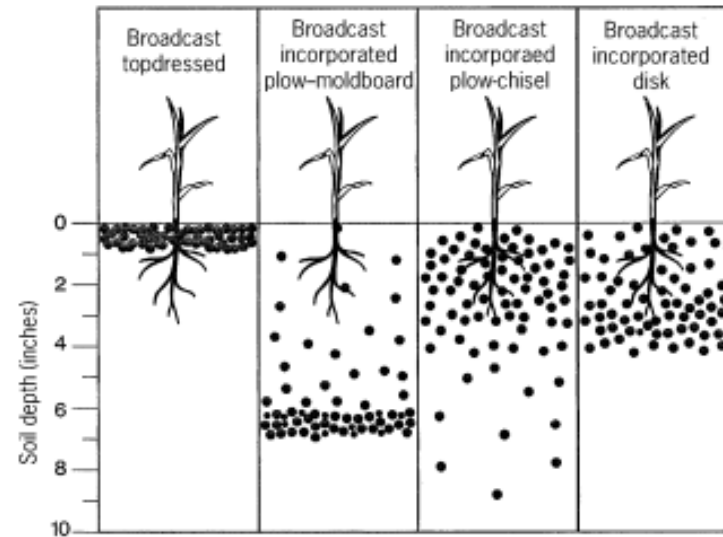


Figure 1. Early season fertilizer distribution using four methods of broadcasting fertilizers. Note that corn plants are used in this example.

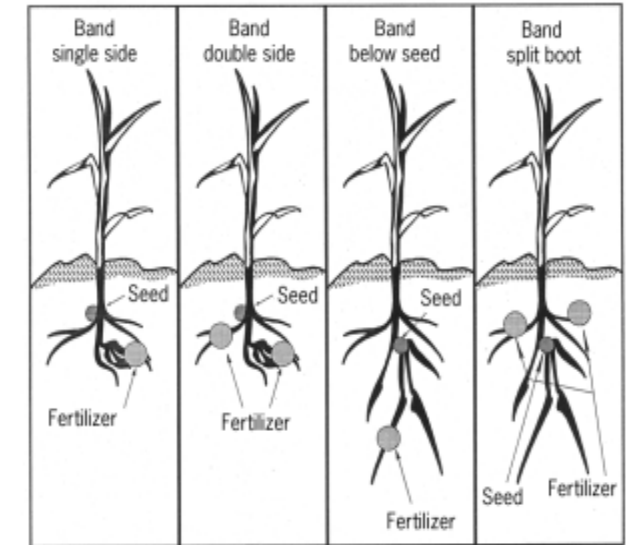
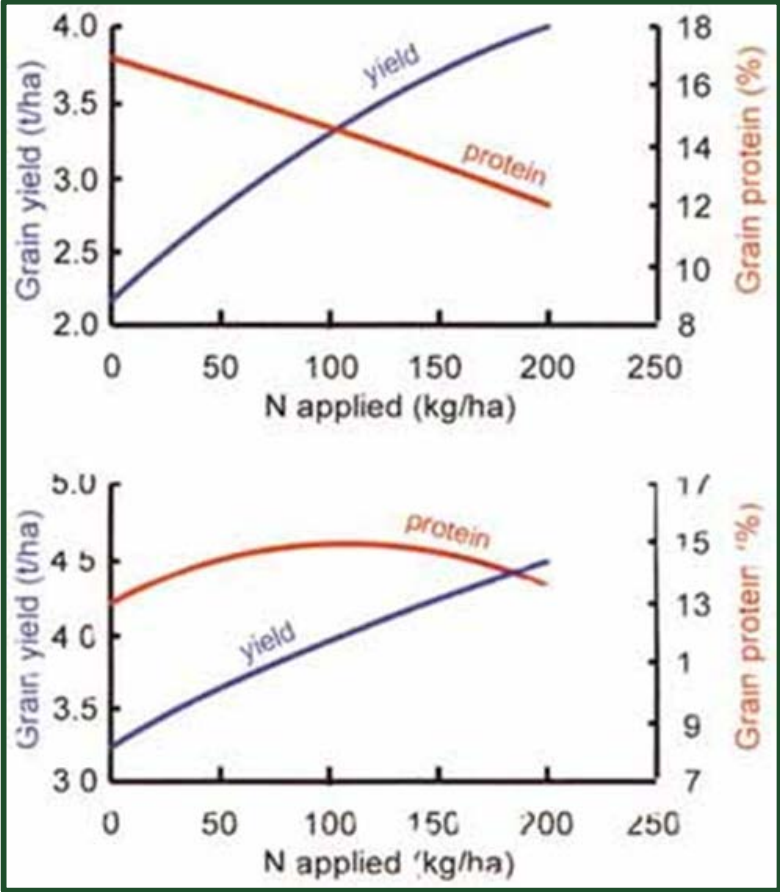
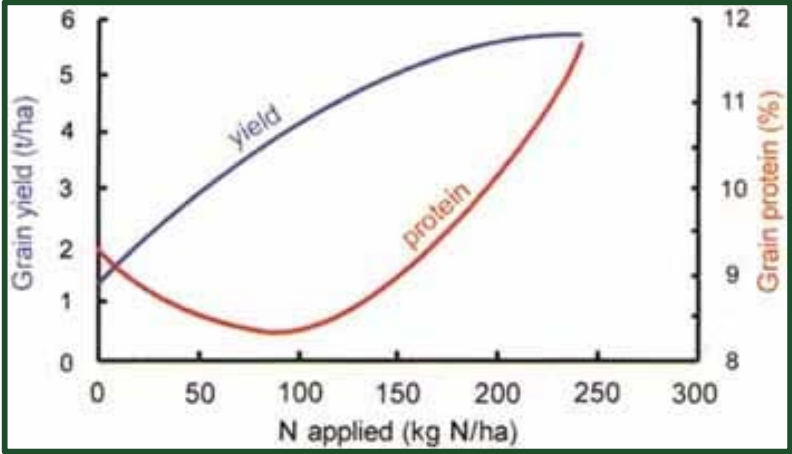


Figure 2. Methods of banding fertilizers. Note that corn plants are used in this example.

Right Rate

- Soil sample for baseline N
- Weigh the risks with weather and application method
 - Will you incorporate?
 - Do you expect moisture?
 - What is the soil temperature?
 - Regulatory Concerns?
 - Variable Rate?

Right Rate



Source: FAO.org

Research Trials: Winter Wheat

Colorado State University
Extension

Fertilizing Winter Wheat

Fact Sheet No. **0.544** Crop Series | **Soil**

by J.G. Davis and D.G. Westfall*

Adequate soil fertility is one of the requirements for profitable winter wheat production. Nitrogen (N) is the most yield-

analyses for availability of the other nutrients, pH, and organic matter content may be sufficient every three to four years.

- <http://extension.colostate.edu/topic-areas/agriculture/fertilizing-winter-wheat-0-544/>

Research Trials: Winter Wheat

Table 1: Suggested N rates for dryland winter wheat, as related to NO₃-N in the soil and soil organic matter content (expected yield, 50 bu/A).

ppm NO ₃ -N in soil*		Soil organic matter, %		
0 – 1 ft	0 – 2 ft	0 – 1.0	1.1 – 2.0	>2.0
—Fertilizer rate, lb N/A—				
0 – 3	0 – 5	75	75	75
4 – 6	6 – 9	75	70	50
7 – 9	10 – 12	75	45	25
10 – 12	13 – 15	50	20	0
13 – 15	15 – 18	25	0	0
> 15	> 18	0	0	0

* Concentration of NO₃-N in the top foot of soil or the sum of NO₃-N concentrations in 1-foot sample depths to 2 feet. – To adjust N rate for expected yields different from 50 bu/A, add or subtract 25 lb N/A for each 10 bu/A difference (maximum N rate is 75 lb/A for dryland winter wheat).

Research Trials: Winter Wheat

Table 2: Suggested nitrogen rates for irrigated winter wheat, as related to NO₃-N in the soil and soil organic matter content (expected yield, 100 bu/A).

ppm NO ₃ -N in soil*	Soil organic matter, %		
	0 – 1.0	1.1 – 2.0	>2.0
0 – 6	125	95	75
7 – 12	105	75	55
13 – 18	85	55	35
19 – 24	65	35	15
25 – 30	45	15	0
31 – 36	25	0	0
> 36	0	0	0

* Sum of ppm NO₃-N in 1-foot sample depths to 2 feet (for sample depths of 1 foot only, multiply the ppm value by 1.67 before using the table).

-To adjust N rate for expected yields different from 100 bu/A, add or subtract 20 lb N/A for each 10 bu/A difference.

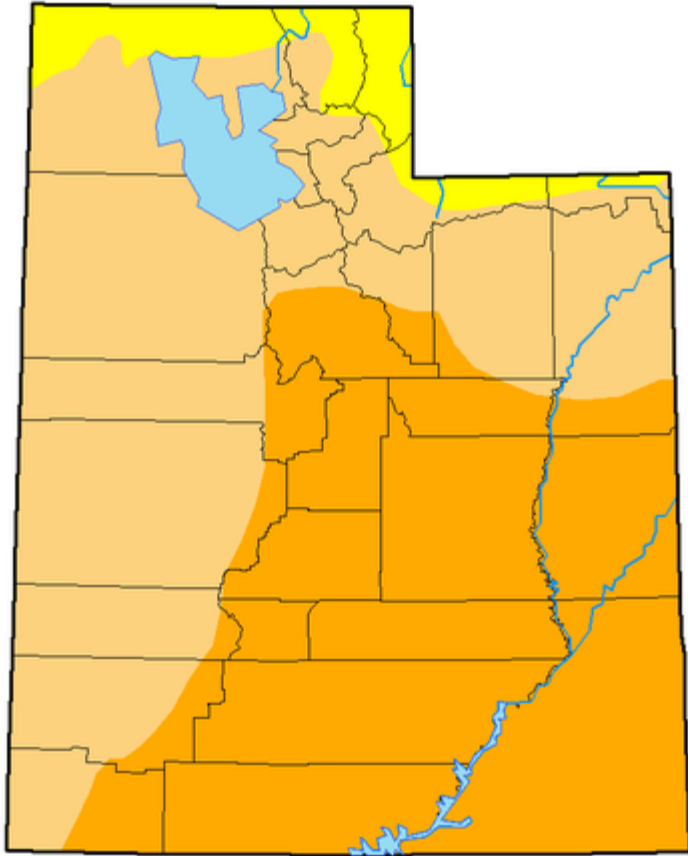
NOTE: Increase the above rates by 40 lb N/A for irrigated wheat in Alamosa, Conejos, Costilla, Rio Grande and Saguache counties.

Research Trials:

- 3 WW varieties: Deloris, Juniper, Fairview
- CSU N recommendations, Irrigated and Dryland
- 5 Timings:
 - Fall Applied
 - Spring Applied
 - Split Fall/Spring (Feekes 3 and 5)
 - Late shot of N at booting
 - 0 N check

- Can we increase % protein?

Recommendation for this year....



Drought Conditions (Percent Area)

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current 1/30/2018	0.00%	100.00%	93.99%	47.53%	0.00%	0.00%
Last Week 1/23/2018	2.04%	97.96%	79.87%	31.66%	0.00%	0.00%
Three Months Ago 10/31/2017	36.07%	63.93%	12.48%	0.00%	0.00%	0.00%
Start of Calendar Year 1/02/2018	9.73%	90.27%	61.37%	19.64%	0.00%	0.00%
One Year Ago 1/31/2017	64.24%	35.76%	0.00%	0.00%	0.00%	0.00%

Questions? Feedback?



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