

Estimating Fertilizer Application Rates Using the Organic Fertilizer Calculator

Washington State Horticulture Association

Organic Session

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- Improve transition from principles to calculator

Thanks to

Dan Sullivan (OSU) &
Craig Cogger (WSU)

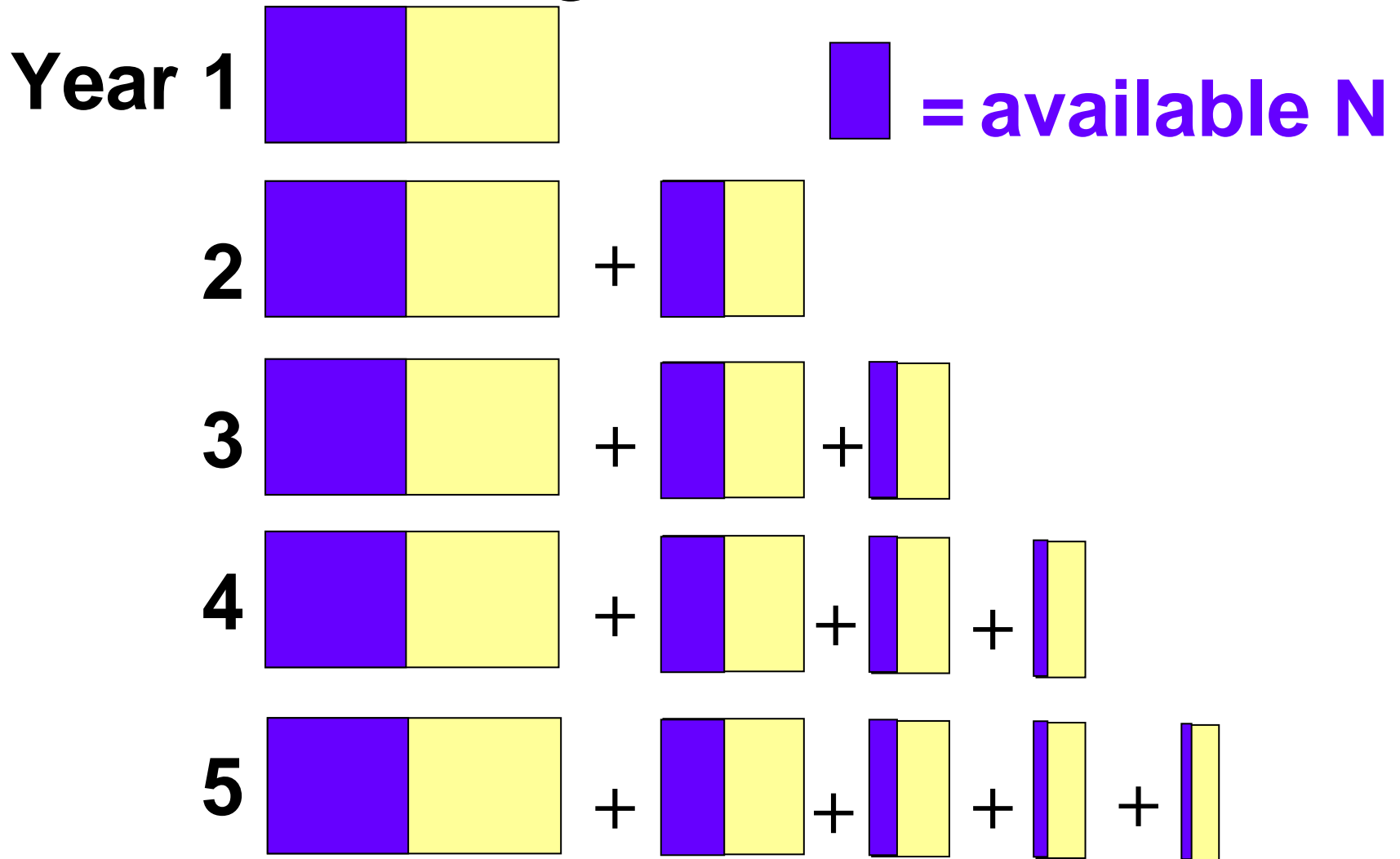
Nitrogen sources

- Soil organic matter (10-30lbs N/acre for each 1% organic matter)
- Compost and manure applications
- Crop residues, N stored in the plant & cover crops
- Irrigation water
- Specialty products (ie. blood, feather, corn, fish meal)

Long-term addition of organic material

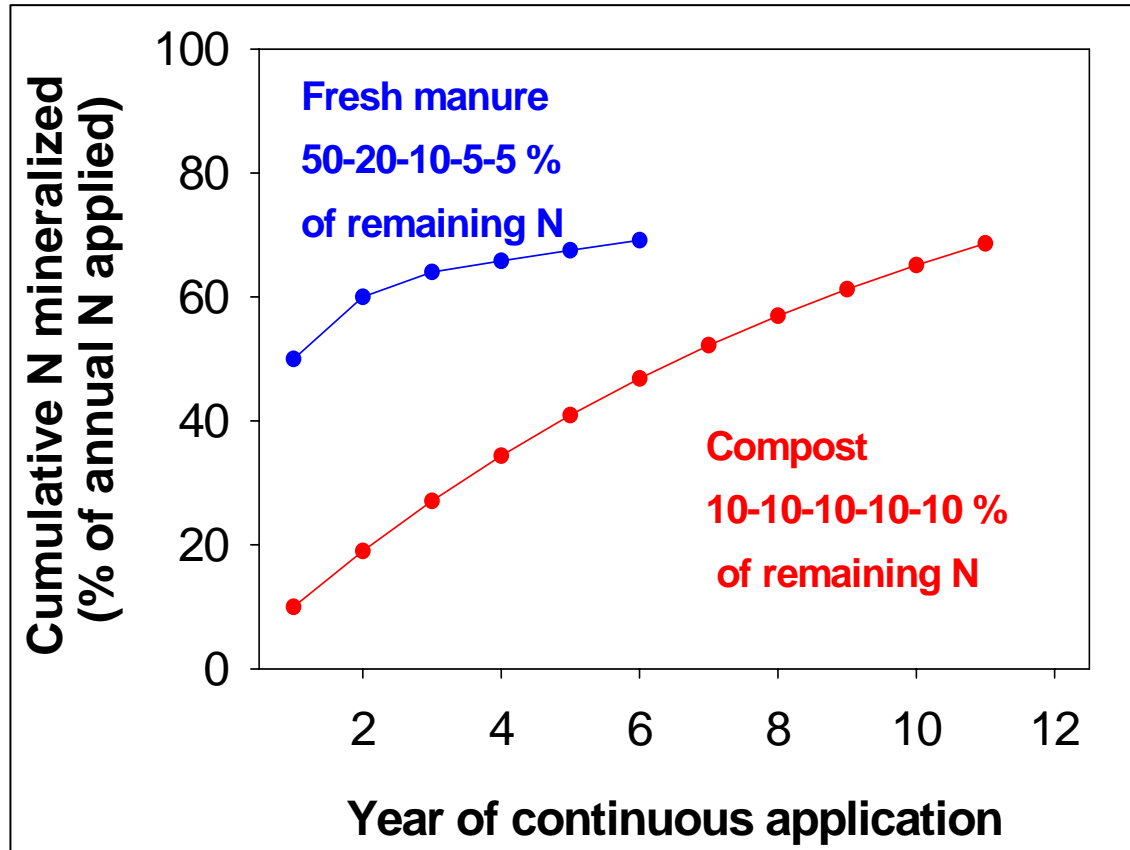
- Increase soil organic matter
- Increase N-mineralization potential of soil

Cumulative available N from an organic source



Courtesy of Dan Sullivan (OSU)

N from compost & manure



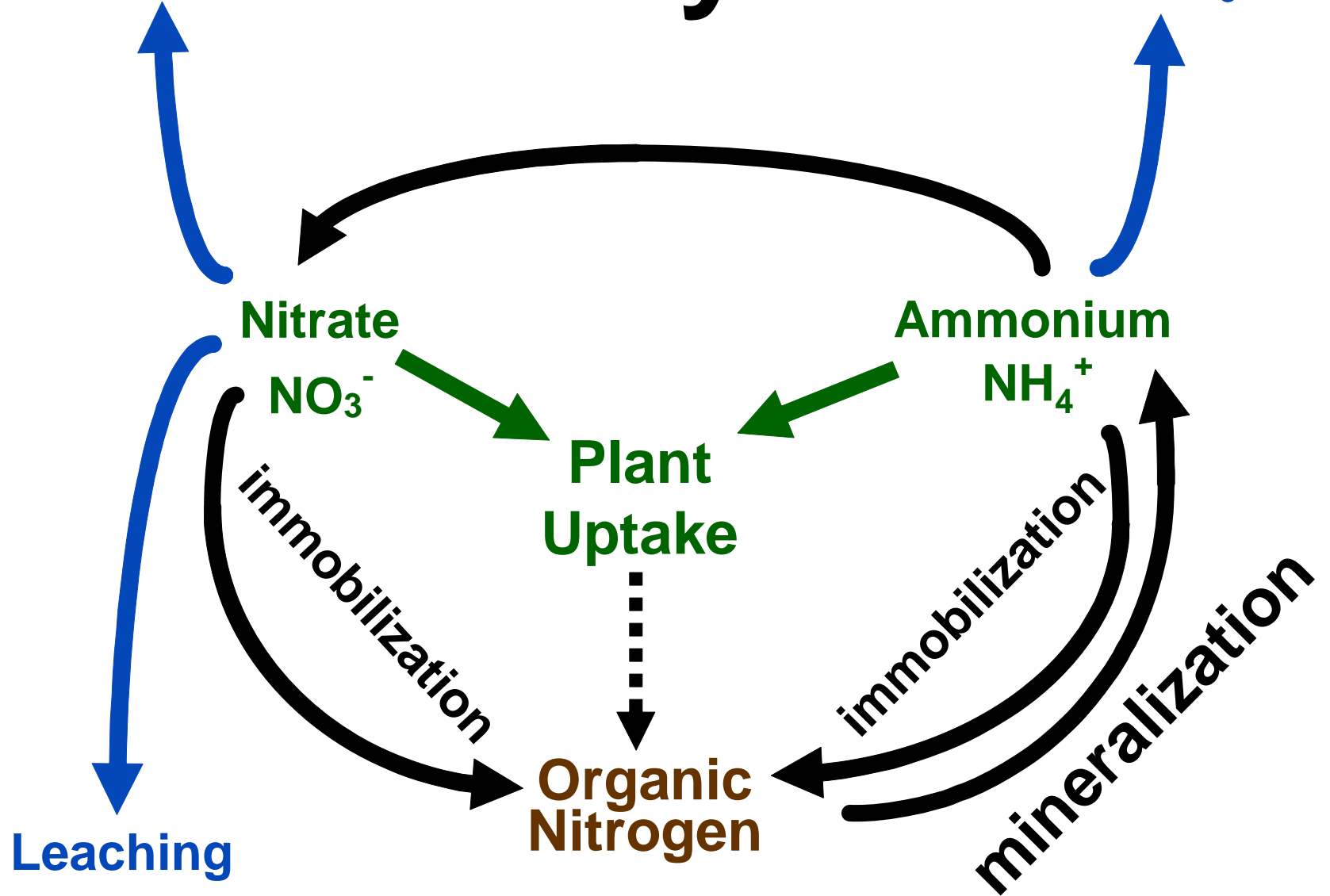
Courtesy of Dan Sullivan (OSU)

<http://smallfarms.oregonstate.edu/organic-fertilizer-calculator>

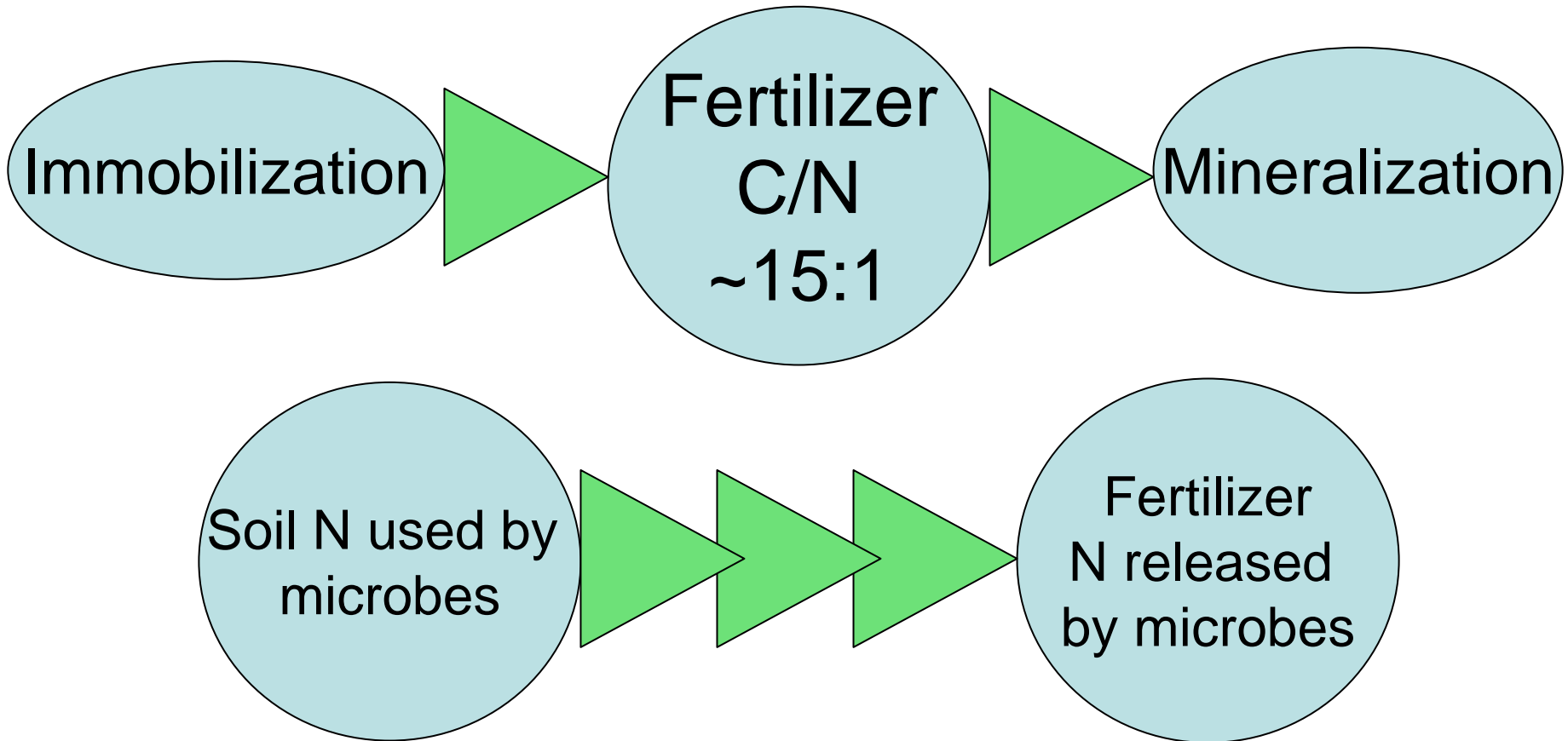
N Cycle

Denitrification
 N_2 or N_2O

Ammonia
 NH_3



Nitrogen Availability



Microorganisms have ~10:1 C:N ratio

Carbon:Nitrogen ratio

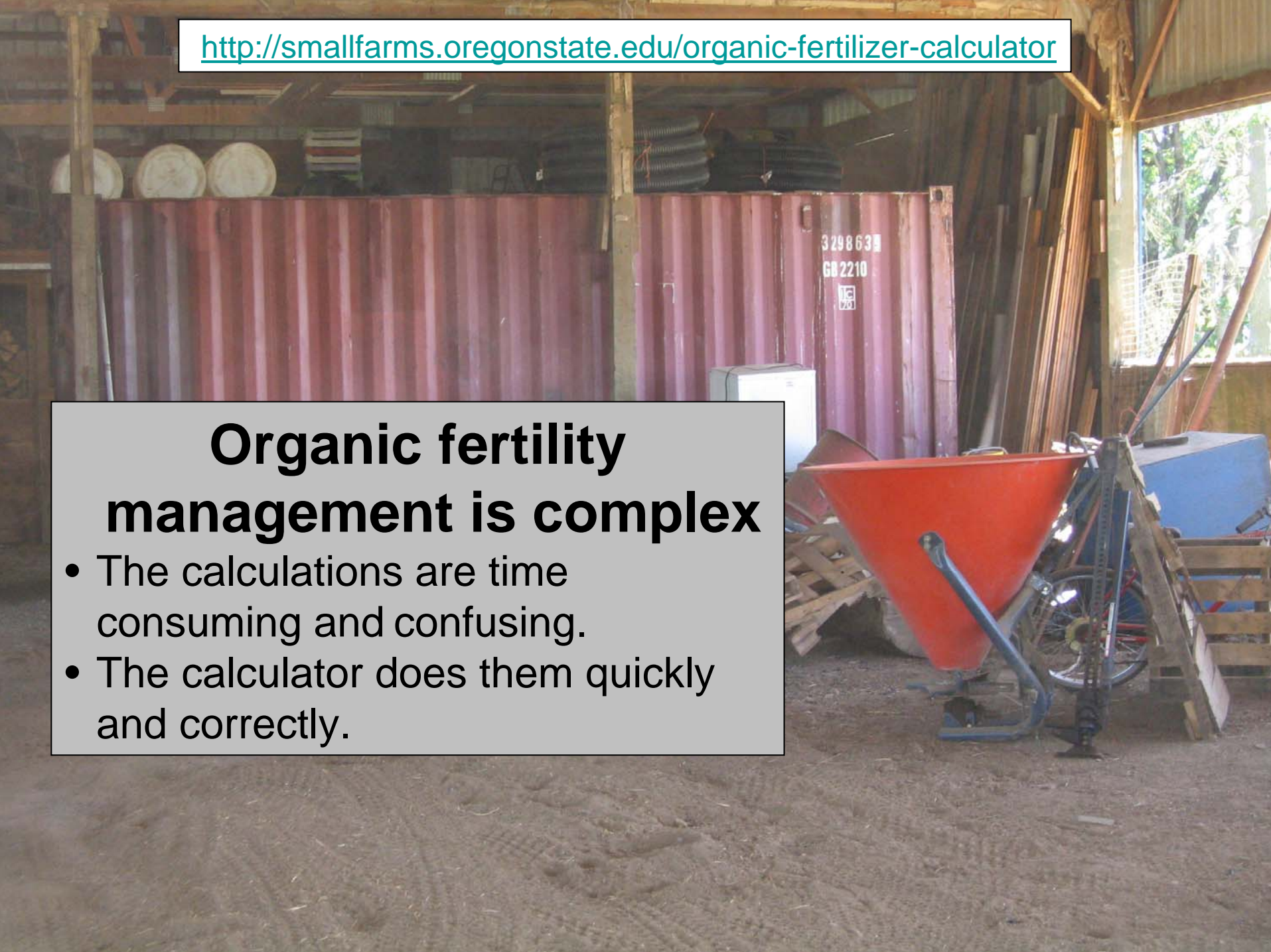
- Ranges from $<5:1$ to $>500:1$ in organic materials
- **Low C:N** - supplies N to plants
- **Medium C:N** - some short term immobilization while decomposing then supplies plants
- **High C:N** - ties up N by biological immobilization

Organic fertility management is complex

- Organic fertilizers have different nutrient ratios and nitrogen availability.
- Fertilizer prices and nutrient requirements vary dramatically.
- Whenever prices or nutrient requirements change the ideal fertilizer program will change.

Organic fertility management is complex

- The calculations are time consuming and confusing.
- The calculator does them quickly and correctly.



What does the calculator do?

- Estimate nutrients provided by a fertilizer or a program the year of application, *ie. 2000lbs of alfalfa meal (2.5-0.5-2) provides 50 lbs total N, 10 lbs P & 40 lbs K.*
- Estimates N-availability from organic sources, *ie. of the 50lbs total N in the alfalfa meal, 5lbs PAN @ 28 days, 13lbs PAN @ full season*



"Organic Fertilizer Calculator"

Estimates of plant-available N (PAN)

Fresh Amendment total N	Example	Fresh Amendment C:N	PAN 28 days	PAN full season
% dry wt.		Approx.	% of total N	% of total N
1	Solid manure w/bedding	35	< 0	0
2	Dairy solids	18	0	15
4	Broiler litter	9	30	45
6+	Specialty products	less than 6	60	75

<http://smallfarms.oregonstate.edu/organic-fertilizer-calculator>

"Fertilizer Calculator" Estimates of plant-available N (PAN)

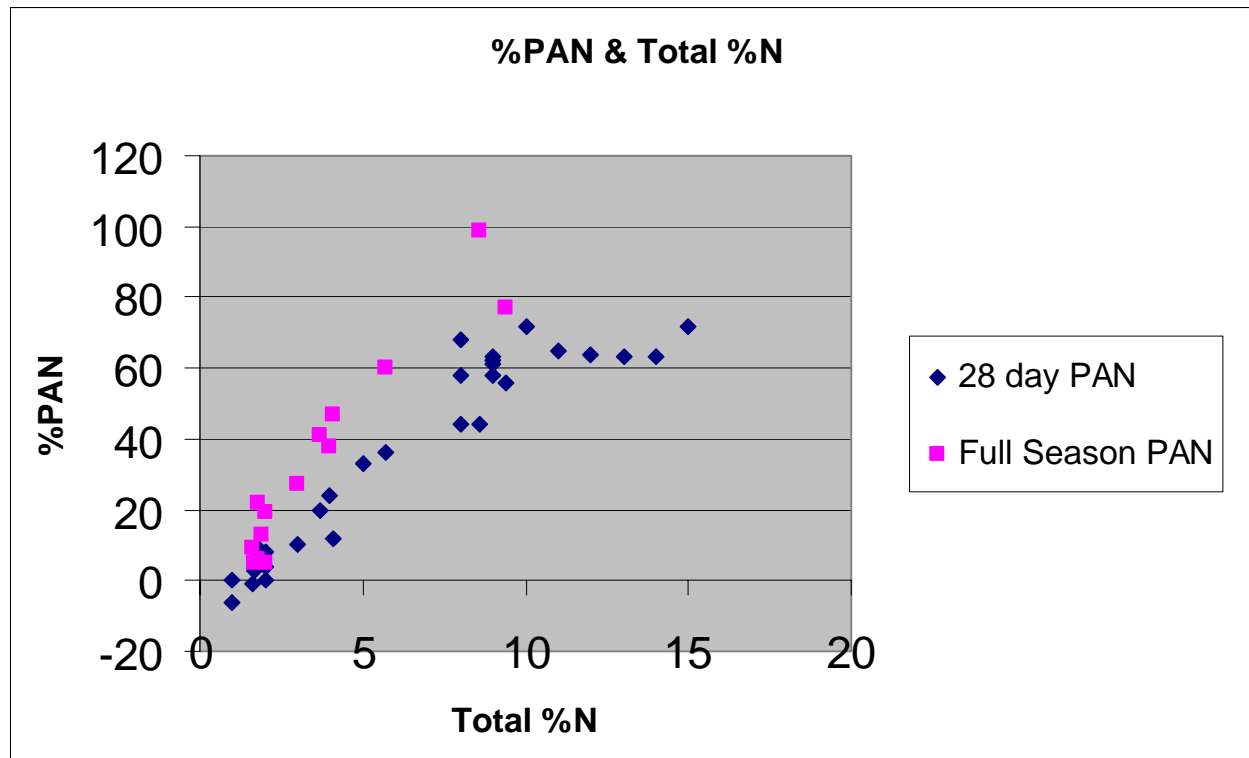
Composted Amendment total N	Composted Amendment C:N	PAN 28 day	PAN full season
% dry wt.		% of total N	% of total N
1	30	0	5
2-3	15 to 10	5	10

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Validation of Organic Fertilizer Calculator: specialty products

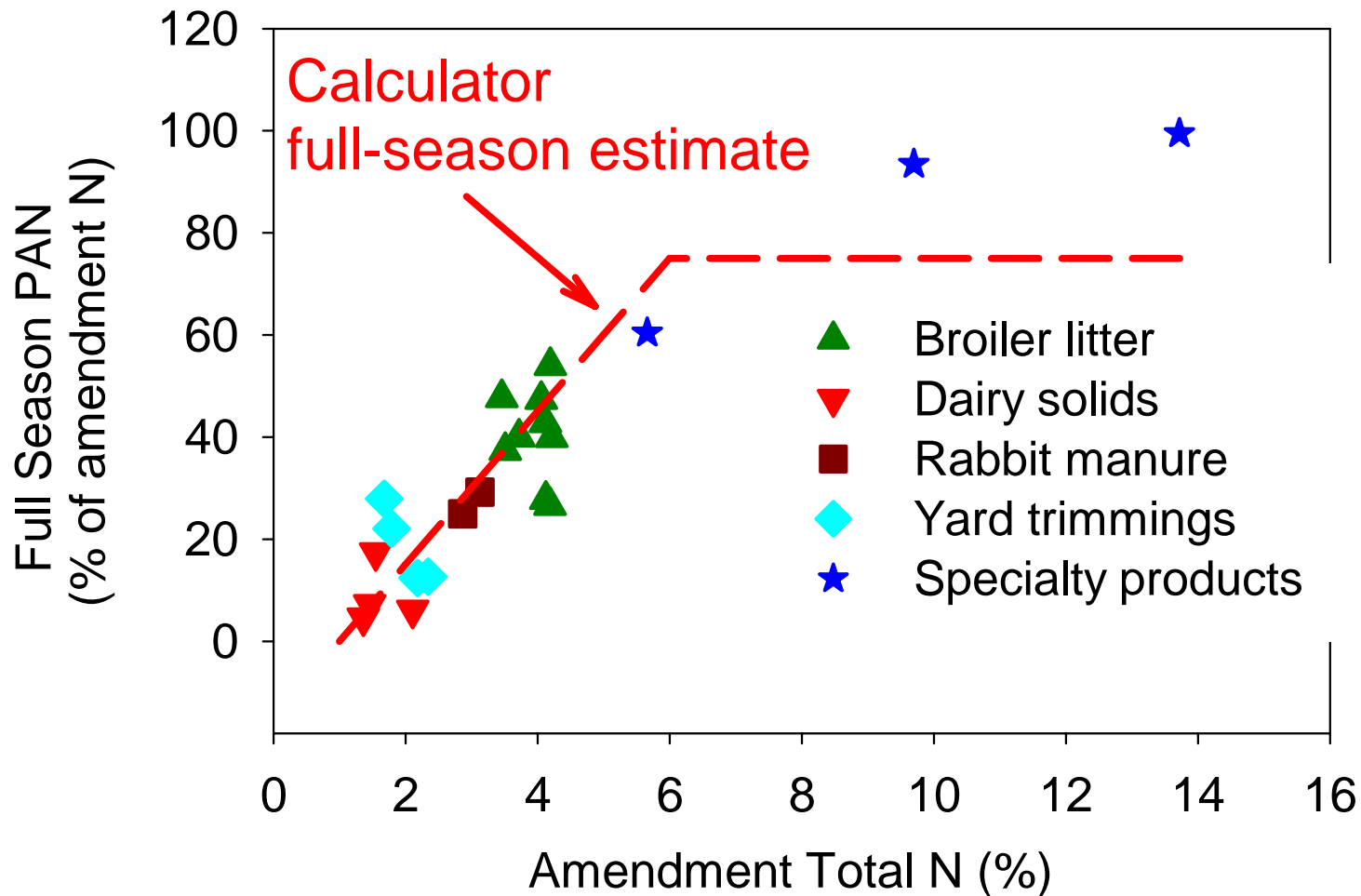
- blends of organic materials
- fish meals
- soybean meal
- corn gluten meal
- feather meal
- alfalfa meal
- blood meal
- bone meal
- kelp meal
- soluble seaweed extract
- ground fish bone
- meat and bone meal
- seabird guano

Plant-Available Nitrogen (PAN)

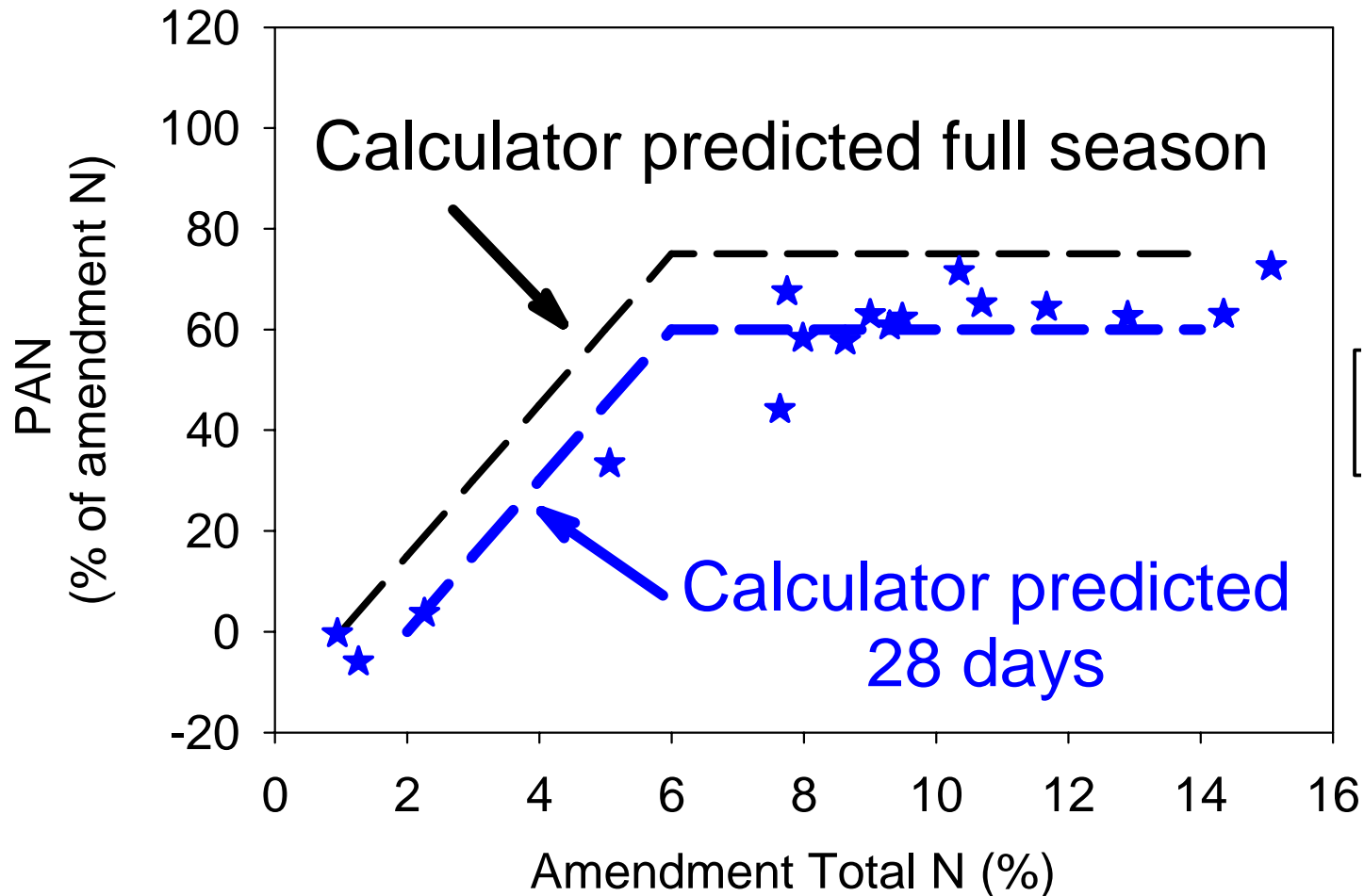


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Basis for Organic Fertilizer Calculator



Validation of Organic Fertilizer Calculator, Specialty products



Courtesy of Dan Sullivan (OSU)

What does the calculator do?

- Makes calculations on “fresh weight” basis
- Calculates the cost of each material and the total cost/acre of the fertilizer program.
- Calculates price/lb of mineral nutrients, ie. P costs \$3/lb.
- Compares your fertilizer plan with your soil nutrient requirements

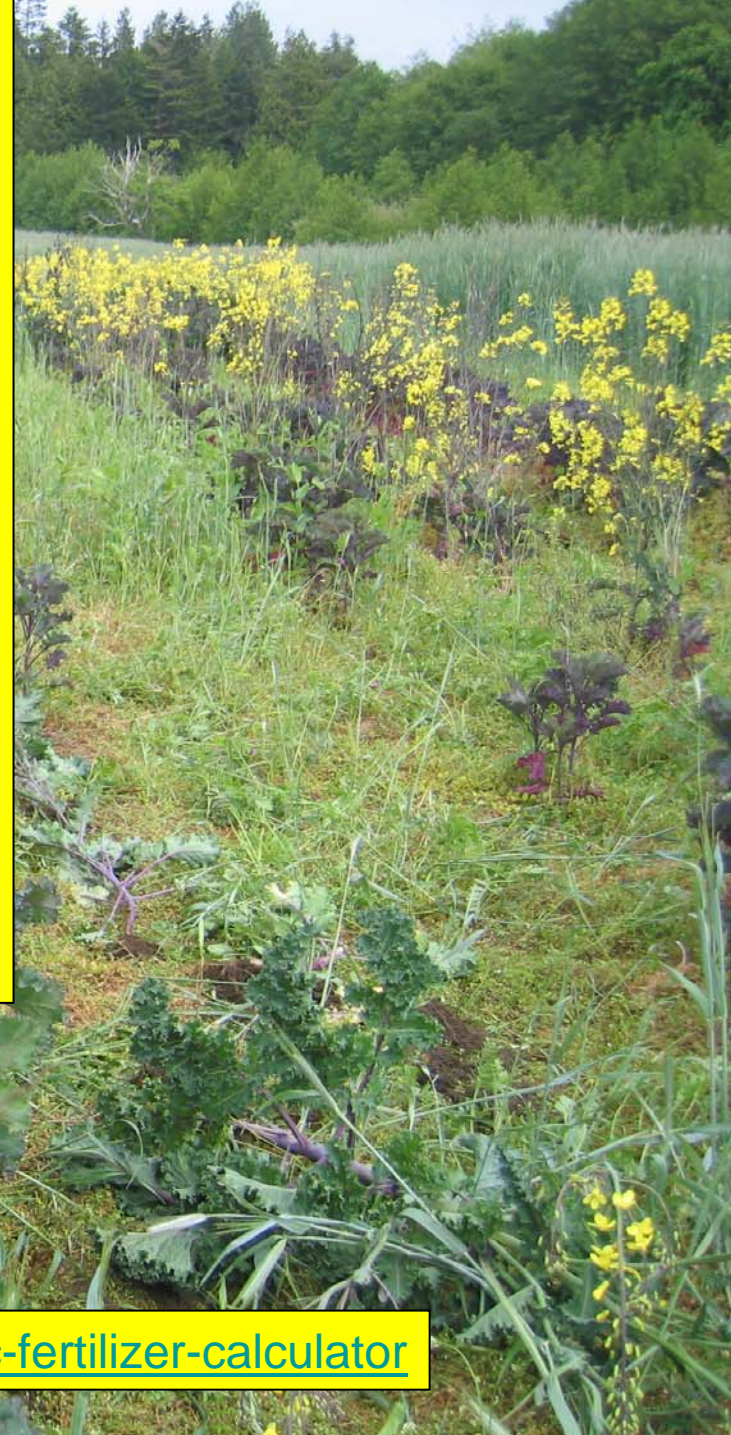


What doesn't it do?

- Estimate environmental losses to evaporation or leaching.
- Estimate the value of micro-organisms in some materials.
- Estimate gradual nutrient release over a number of years.
- Indicate how easy a product is to use.

How to start

- Finalize your fertility plan using test results and fertilizer guides.
- Download the calculator and instructions.
- Check the fertilizer analyses of your products.
- Get prices and % dry matter from your supplier.
- **NOW YOU'RE READY!**



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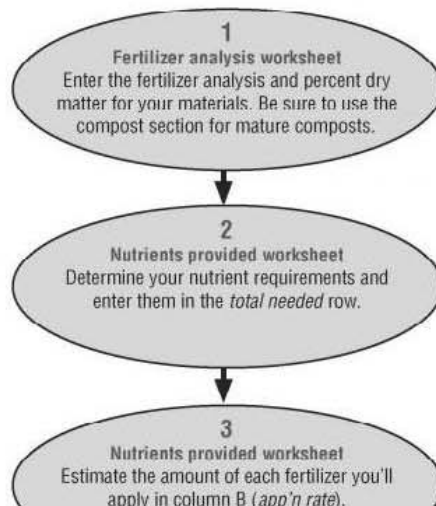
[User Guide: Organic Fertilizer Calculator](#)

[Download Commercial Calculator](#) (per acre calculations)

[Download Small Farm/Garden Calculator](#) (square foot calculations)

ORGANIC FERTILIZER CALCULATOR QUICK USER'S GUIDE

<http://smallfarms.oregonstate.edu/organic-fertilizer-calculator>



Quick User's Guide

1) "Fertilizer analysis"

confirm the fertilizer analysis and enter percent dry matter for your materials, be sure to use the compost section for mature composts.

2) "Nutrients provided"

determine your nutrient requirements and enter them in row 46.

3) "Nutrients provided"

estimate the amount of each fertilizer you'll apply in column B (app'n rate).

4) "Costs"

enter the price/lb ("as-is" basis) of each material in column B and compare costs per lb nutrient.

5) Check

how closely the fertilizer program matches your nutrient requirements and budget. Adjust the amount applied (step 3) as needed.