GRIMM FAMILY CENTER FOR ORGANIC PRODUCTION AND RESEARCH

ORGANIC NUTRIENT MANAGEMENT:

Nitrogen Management in organic production can pose a challenge to growers because any fertilizer applied must first be mineralized by soil microbes before it is available to the plant. There are many factors that can influence the amount of nitrogen mineralized and the timing of nutrient management. The Grimm Family Center seeks to investigate these interactive factors through a range of research projects on nitrogen mineralization.

WHAT IMPACTS FERTILIZER NITROGEN MINERALIZATION?

ORGANIC NITROGEN AVAILABILITY

FERTILIZER MAKE-UP
- C:N ratio raw material
- Chemical properties
- Soluble N and C

IRRIGATION MANAGEMENT
- Irrigation rate
- Wet/dry cycles
- Irrigation system

APPLICATION METHOD
- Liquid or solid
- Incorporated vs surface
- Pellet density

SOIL PROPERTIES
- Soil organic matter
- Available nutrients
- Clay content
- pH, EC, sodium

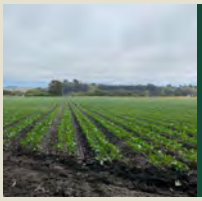
ENVIRONMENTAL FACTORS
- Temperature, precipitation
- Season, regional climate

COMPLETED & ONGOING RESEARCH

Investigating fertilizer pellet density and chemical composition

On-farm irrigation and fertilizer rate trials

Interactive effects of fertilizer source and temperature



Effects of soil properties

WHAT WE LEARNED

- **Organic fertilizers varied in their response to different temperatures**
- **Building and maintaining soil health and fertility is important to optimize nutrient cycling and plant nutrition in organic production systems**

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ORGANIC FERTILIZER PELLET DENSITY AND NITROGEN MINERALIZATION

BACKGROUND

- A fertilizer's Pellet Density Index (PDI) reflects how tightly a pellet is packed.
- A high PDI helps the fertilizer pellets stay intact through transportation and application.

Does PDI impact nitrogen mineralization?

EXPERIMENTAL SETUP

- We incubated soil from an organic vegetable field in Salinas, CA, at 20°C for 5 weeks, adding intact and crushed Nature Safe fertilizers with varying PDI, unpelleted mash, and no fertilizer at 100 mg N/kg soil (~200 lb N/acre).
- Ammonium and nitrate concentrations were measured after 0, 7, 14, 21, 28 and 35 days of incubation

KEY FINDINGS

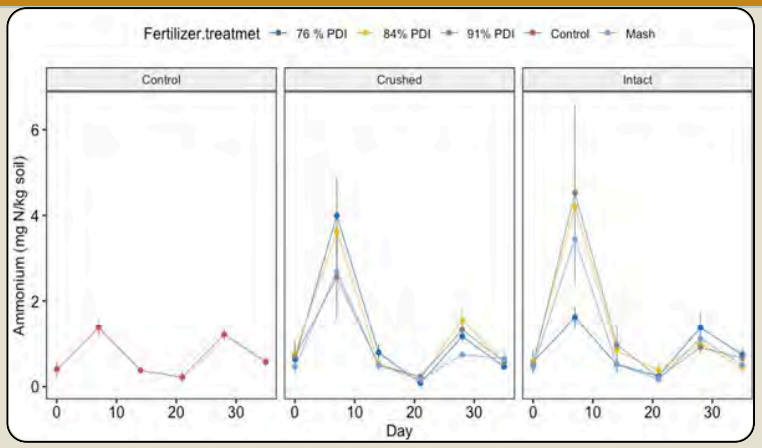

Fig. 1 Soil ammonium concentration

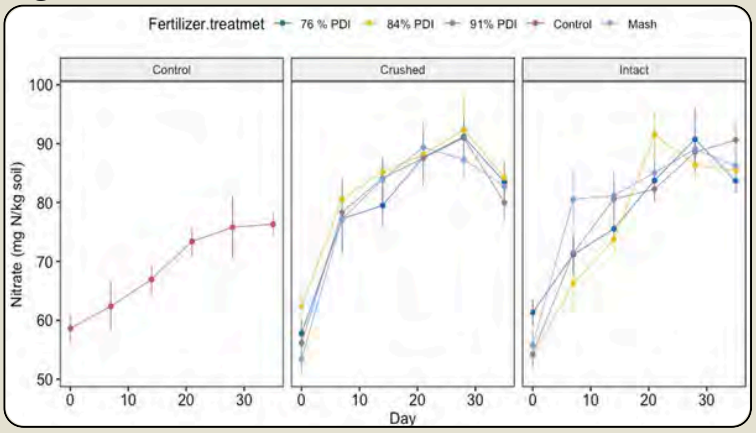

Fig. 2. Soil nitrate concentration

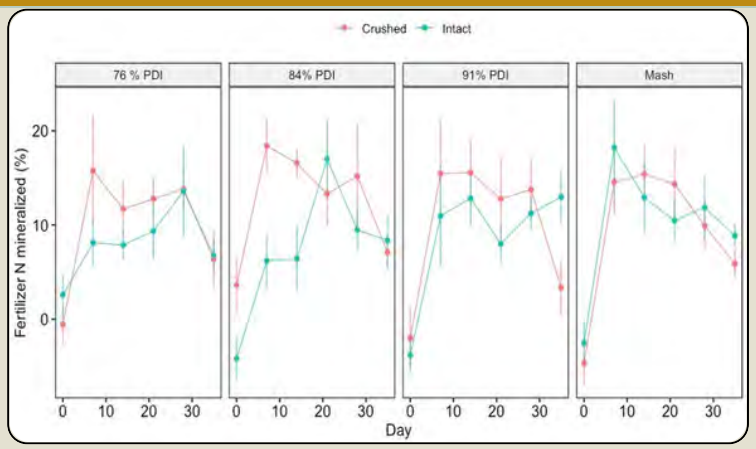

Fig. 3. Percentage fertilizer N mineralized

- Crushing and PDI did not significantly effect ammonium concentrations (Fig. 1).
- Crushing but not PDI tended to increase Nitrate concentrations (Fig. 2).
- Percent fertilizer N mineralized tended to be greater in crushed treatments (Fig. 3).
- Mineralization rate was relatively low. Possible reasons include surface application of the fertilizer, and/or the soils relatively high nitrate concentration and moisture content at the start of the incubation.

- **Higher N mineralization in crushed may reflect enhanced microbial activity due to increased surface area but the differences were small, and not likely to be of agronomic importance**
- **Our findings suggest that a higher PDI pellet does not reduce N mineralization**

NEXT STEPS

- Continue research to improve nitrogen uptake in organic cropping systems
- Support organic growers in meeting upcoming regulatory requirements related to nitrogen management
- Educate marketers, the public, and policymakers on organic prospects and needs.

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