

Seafood Derived Soil Amendments & Fertilizers

PURPOSE AND SCOPE

This resource provides key considerations for developing seafood-derived soil amendments and fertilizers, including product type, intended use, particle size, nutrient release, application performance, regulatory requirements and product testing. It is intended to support early-stage product development and help identify important considerations when evaluating fisheries by-products for value-added agricultural applications.

1. CHOOSE THE RIGHT PRODUCT

Start by asking: What is the primary purpose of your product?

Turning fish-processing by-products into a fertilizer or soil amendment can create a higher-value product while reducing the costs and environmental impacts associated with waste disposal. Soil amendments and fertilizers offer different opportunities and requirements and will appeal to different end users. Fertilizers require greater upfront investment in product characterization, testing, regulatory compliance and market development. This additional research will provide more clearly defined and measurable benefits and may lead to higher potential market acceptance and long-term value than a product positioned primarily as a general soil amendment.

Goal	Product type	Outcomes
Improve a defined soil property or function	Soil amendment	Depends on the product's composition, application rate, soil type and soil conditions
Supply plant nutrients	Fertilizer	Promote plant growth, nutrient uptake and crop yield
Improve soil and supply nutrients	Dual-purpose product	Depending on formulation and claims

Key Differences

Feature	Soil amendment	Fertilizer
Primary purpose and goal	May improve or modify specific soil physical, chemical, or biological properties depending on the product and soil conditions.	Supplies nutrients for plant growth. May increase crop growth and yield.
Nutrient content	Nutrient content and availability vary by material; nutrients may be released through dissolution or biological decomposition at rates determined by product composition and soil conditions.	Formulated to supply plant nutrients (nitrogen (N), phosphorus (P), potassium (K) and/or micronutrients).
Mode of action	May modify specific soil physical, chemical, or biological properties, depending on the material's composition, application rate and soil conditions.	
Response time	Response may be rapid or gradual depending on nutrient form, solubility, particle size, processing, soil pH, moisture, temperature and microbial activity.	
Application frequency	Timing and frequency depend on the product, crop requirements, soil conditions, application rate and label directions.	
Compatibility with equipment	Compatibility with application equipment should be evaluated using the finished product's physical properties and intended application method.	

Regulatory classification	Regulated by the CFIA as a supplement under the Fertilizers Act and Regulations. Products must comply with safety, labelling and, where applicable, pre-market registration requirements. Most supplements require registration, while exemptions are generally based on the product's ingredients, formulation, and eligibility under the CFIA Fertilizers Regulations. Additional provincial requirements may apply for certain materials (e.g., biosolids, wood ash, pulp sludge).	Regulated by the CFIA under the Fertilizers Act and Regulations. Products must comply with safety, labelling and, where applicable, pre-market registration requirements. Some fertilizers require registration, while many are exempt, depending on the product's ingredients, formulation, intended use, and eligibility under the CFIA Fertilizers Regulations.
Examples	Compost, biochar, peat moss, gypsum, agricultural lime and other soil conditioners	Urea, Monoammonium phosphate (MAP), Liquid fertilizer concentrates, NPK fertilizers
Note: Seafood-derived materials (e.g. fish meal, fish hydrolysate, seaweed, shellfish by-products) vary widely in nutrient composition, nutrient availability, liming potential, salinity, decomposition rate and soil response; each finished product should be characterized and tested for its intended use. CFIA Fertilizers Act and Fertilizers Regulations		

2. CHOOSING THE RIGHT PARTICLE SIZE

Particle size is an important product specification that influences nutrient release, application performance, handling, storage and overall product performance.

Particle size	Size (mm)	Typical characteristics
Fine	0.85-1.40	Greater surface area and generally faster reaction or decomposition; potentially faster nutrient release depending on product composition and soil conditions.
Medium	1.40-2.00	Potential balance between reaction rate and handling performance; product-specific testing is required.
Standard granules	2.00-3.35	Generally suitable for mechanical spreading when particle size, density, shape, hardness, moisture and flowability are sufficiently uniform.
Coarse granules	3.35-4.75	Potentially improved flowability and slower reaction or nutrient release; suitable for products intended to provide a slower or more sustained response.

Note: Commercial granular fertilizers are typically manufactured within a particle size range of approximately 1-5 mm, with most particles commonly falling between 2 and 4 mm. For lobster-shell and fish-derived products, the optimum size should still be selected based on the intended application, material composition, desired reaction rate, spreading method and acceptable dust level.

KEY PRODUCT DEVELOPMENT CONSIDERATIONS

- **Nutrient release:** Fine particles generally react or decompose faster and may increase the rate of nutrient release, while coarser particles may react more slowly. The actual response depends on product composition and soil conditions.
- **Application performance:** Maintain a uniform particle-size distribution and consider particle density and shape to improve spreading accuracy and reduce segregation.

- **Handling and storage:** Fine particles are generally more prone to dust and caking, while coarser particles may offer better flowability. Moisture, fat content, hygroscopicity, particle hardness and storage conditions should also be assessed.
- **Soil performance:** Fine particles generally react more quickly with soil, while coarser particles may react more slowly and persist longer. The soil effect depends on material composition, application rate and soil conditions.

For seafood-derived products, particle size should be evaluated alongside nutrient composition and availability, carbon-to-nitrogen ratio, calcium carbonate content and liming value, chitin content, pH, electrical conductivity and salinity, moisture content, decomposition rate, odour, application rate, soil type and crop-safety response.

COMMERCIALIZATION CHECKLIST

- ☒ Define the target market and intended application
- ☒ Secure a reliable raw material supply
- ☒ Characterize the raw material and finished product
- ☒ Conduct appropriate laboratory and greenhouse or incubation tests
- ☒ Validate agronomic performance through replicated field trials
- ☒ Select the appropriate product form and particle size
- ☒ Ensure compatibility with intended end users, or farming equipment if applicable
- ☒ Understand regulatory, food safety and organic certification requirements

KEY TAKE-HOME MESSAGES

- Particle size is one of several important product design considerations and should be evaluated alongside formulation and intended use
- Select particle size based on the intended application, product composition, desired reaction or nutrient-release rate, soil conditions and application method
- Most commercial granular fertilizers use particles between 2-4 mm
- Maintain a uniform particle size for consistent spreading and product quality
- Particle size alone does not determine nutrient availability or soil response
- For seafood-derived products, composition, processing, soil conditions and application rate are equally important
- Consider handling, storage and compatibility with existing application equipment during product development

REFERENCES

- [Fertilizers Regulations](#)
- [Physical Specifications for Granular Fertilizer and Soil Amendment Products \(FEECO\)](#)
- [The Role of Particle Size in Our Soil \(Vermont Compost\)](#)
- [Fertilizers and Particle Size \(Foliar Pak\)](#)
- [Why Fertilizer Particle Size Matters \(Lebanon Turf\)](#)
- [Soil Amendments \(OSU Ohioline / FABE-550\)](#)
- [Biosolids and Manure Comparison \(Government of British Columbia\)](#)
- [Soil Amendments and Fertilizers \(Hood College\)](#)
- [Understanding Fertilizer and Soil Amendment Types \(CEI Fact Sheet\)](#)

Factsheet author:

Gaby Lis Baby, Seafood, Food Scientist, Seafood Services, Perennia Food and Agriculture

Factsheet contact:

Perennia's Seafood Services Team
Email: seafood@perennia.ca