FISH SH!T: A UNIQUE SOIL AMENDMENT WITH OVER 4,000 DISTINCT AND SPECIFIC MICROBES, HAS PROVEN EFFECTIVE IN INCREASING YIELDS, IMPROVING PRODUCT QUALITY, AND INCREASING PLANT GROWTH AND DEVELOPMENT

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INTRODUCTION

Based on current economic factors and eroding soil conditions, farmers face increased pressure to deliver products to end consumers in a way that provides a profitable business operation. Fish Sh!t is the most robust biologic available on the market, with over 4,000 individual and distinct microbes, providing a benefit for crops from seed to harvest. Fish Sh!t is 100% organic and is OMRI, USDA BIOPREFFERED, CDFA, and CFIA certified, and has proven effective in increasing yields, improving product quality, and increasing plant growth and development. This white paper presents the results of independent third party lab testing, field trials, and controlled studies which demonstrate the efficacy of Fish Sh!t in various agricultural applications.

BENEFITS OF FISH SH!T AS A SOIL AMENDMENT AND PREVENTING SOIL EROSION

Soil erosion caused by farming activities has a negative impact on agricultural activities. Farming has caused erosion in the Midwest, raising grassland remnants over cultivated areas. Over 150 years, hilltop soil thickness has decreased by almost 2 mm per year. Historical erosion rates surpass national soil erosion evaluations and USDA acceptable thresholds. (Thaler et al., 2022). This decline in soil thickness can lead to reduced crop yields, decreased soil fertility, and increased runoff of pollutants into nearby water sources, ultimately impacting the sustainability of agricultural activities.

The unique combination of microorganisms in Fish Sh!t provides a range of benefits to plants and soil. The microbes in Fish Sh!t are designed to break down complex organic and synthetic matter and release essential nutrients into the soil**.** Fish Sh!t is a potent biostimulant which aids plant growth and development by increasing; tap root growth, root diameter, soil water holding capacity, microbial activity, and nutrient availability. Fish Sh!t also permeates the soil, which

further enhances root growth and development, as well as improving water retention and drainage. As a result, plants grown in Fish Sh!t-treated soil are more vigorous and are better able to withstand drought, disease pressure and pest pressure, leading to improved overall crop yields.

CURRENT ECONONOMIC CONDITIONS AFFECTING FARMERS

With the increasing costs of fuel, equipment, labor, and fertilizer due to inflation, farmers need better inputs and amendments to maximize product yields and quality. Table 1 immediately below details dramatic increases over the last two growing seasons, in fertilizer costs for corn and soybeans; (Schnitkey et al., 2023), resulting in an inflationary cost increase of 26% to 29%.

Table 1. Fertilizer Costs for Corn and Soybeans Using Fertilizer Prices in September 2021 and September 2022

	Requirments[1]	Prices on 9/23/2021[2]		Prices on 9/22/22[3]		
		Prices	Costs	Prices	Costs	Change
Panel A. Corn[4]	lbs/acre	$/ton	$/acre	$/ton	$/acre	$/acre
Anhydrous Ammonia[5]	170	788	67	1,318	112	45
DAP[6]	177	742	66	947	84	18
Potash[7]	88	657	29	857	38	9
Nitrogen stabilizer			13		13	
Total Fertilizer Costs			**$175**		**$247**	**$72**
Panel B. Soybeans[8]	lbs/acre	$/ton	$/acre	$/ton	$/acre	$/acre
DAP[9]	111	742	41	947	53	12
Potash[10]	133	657	44	857	57	13
Total Fertilizer Costs			**$85**		**$110**	**$25**

FISH SH!T PRODUCT PROFILE

No one else in the world provides a product manufactured from fish manure that has no available NPK (Table 2; Midwest Labs) with a biological profile as robust as Fish Sh!t (Graph 1; Microbial Insights). With such a broad biological profile, Fish Sh!t provides benefit to each phase of a plant's life cycle. Fish Sh!t's microbes are "alive inside" every bottle. This translates to an immediate effect on plants when Fish Sh!t is applied, as the product does not require reanimation – Fish Sh!t goes to work when it hits the dirt! Fish Sh!t microbial testing is done from filled and finished bottles of product, ensuring consistency so the results are exactly what the farmer will be

receiving every time they utilize the product. Every sized bottle of Fish Sh!t has a vented cap allowing the microorganisms inside to continue to thrive as a "living ecosystem". This "living ecosystem" combined with Fish Sh!t's robust microbial profile provides farmers with a powerful combination unlike any other product available on the market.

TABLE2

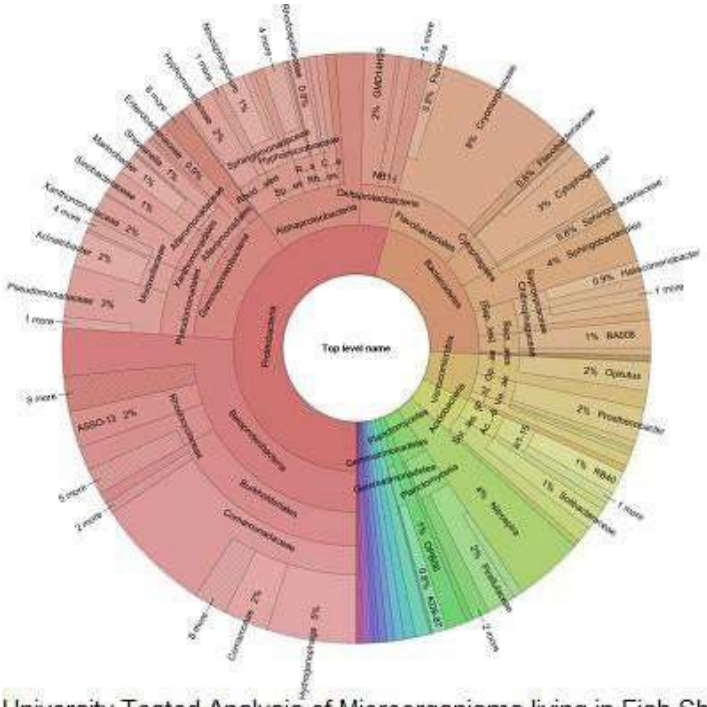
Midwest Laboratories, Inc.

13611 B Street • Omaha, Nebraska 68144-3693 • (402) 334-7770 • FAX (402) 334-9121 • www.midwestlabs.com

Lab # 8704302	Report of Analysis		Report Number: 19-353-4140
Account: 47318		Robert Ferris Account Manager	
Date Sampled:			
Date Received:	2019-12-12	Fish Sh!t	
Sample ID:	FishSh!t		

		Analysis (as rec'd)	Analysis (dry weight)	Total content, lbs per ton (as rec'd)
NUTRIENTS				
Nitrogen				
Total Nitrogen	%	0.06	8.57	1.2
Organic Nitrogen	%	0.05	6.71	0.9
Ammonium Nitrogen	%	0.013	1.857	0.3
Nitrate Nitrogen	%	< 0.01	---	---
Major and Secondary Nutrients				
Phosphorus as P2O5	%	< 0.1	---	---
Potassium as K2O	%	< 0.1	---	---
Sulfur	%	< 0.05	---	---
Calcium	%	0.05	7.14	1.0
Magnesium	%	0.02	2.86	0.4
Sodium	%	0.010	1.429	0.2
Micronutrients				
Zinc	ppm	< 20	---	---
Iron	ppm	< 50	---	---
Manganese	ppm	< 20	---	---
Copper	ppm	< 20	---	---
Boron	ppm	< 100	---	---

GRAPH 1



University Tested Analysis of Microorganisms living in Fish Sh!t

FIELD TRIALS

Fish Sh!t testing for both row (corn) and specialty (melons) crops shows a marked improvement in both yield and product quality. In a field trial of 100 acres of corn in each of the test and control groups, Fish Sh!t was dosed at 10 ounces per acre, one time, in furrow. Results show not only a 10 bu/ac increase in kernels, but also an increase in starch content (Table 3; AgPlots).

TABLE 3

Prepared by: AgPlots on Nov 17, 2022

Crop	Corn	Previous Crop		Tillage	Conventional
Plot Location	(41.95054, -85.93491)	Planting Date	5/21/2021	Harvest Date	11/3/2021

Rank (by yield)	Variety	Supplier	Length (ft)	Width (in)	Weight (lb)	Test Weight (lb/bu)	Moisture (%)	Yield (bu/ac)
2	Untreated	None	366.0	360	3528	56.4	22.8	227.0
1	Fish Shit	Fish head farms	366.0	360	3665	57.0	22.5	236.7

In an independent field trial, Fish Sh!t was tested on cantaloupes grown on 5 acres with 9,000 vines in the control group and 5 acres with 9,000 vines in the test group, dosed at 10 ounces per acre four times; once upon transplantation and three more times during the season whenever the vines were picked. Results showed an increase in yield of 5,000 additional melons per acre treated with Fish Sh!t as well as increases in nutrient uptake; specifically, calcium (harder shell, longer shelf life) and Sulphur (sweeter melons) (Table 4; Midwest Labs). These results demonstrate a statistically significant improvement in yields ($p < .0001$) and enhanced product quality.

TABLE 4

REPORT NUMBER
22-187-7306
COMPLETED DATE
Jul 08, 2022
RECEIVED DATE
Jul 06, 2022

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www.midwestlabs.com
IDENTIFICATION
58229

TODAY'S DATE
Jul 08, 2022

CANTALOUPES PLANT ANALYSIS

		Analysis Method	LECO Combustion	AOAC 985.01 (mod)										
			Nitrogen	Phosphorus	Potassium	Magnesium	Calcium	Sulfur	Sodium	Iron	Manganese	Boron	Copper	Zinc
			N	P	K	Mg	Ca	S	Na	Fe	Mn	B	Cu	Zn
Sample ID	Lab Number		% Rate	% Rate	% Rate	% Rate	% Rate	% Rate	% Rate	ppm Rate	ppm Rate	ppm Rate	ppm Rate	ppm Rate
Fish Sh!t	**3767279**		**3.36** *L-D*	**0.33** *L-D*	**2.42** *D*	**0.82** *E*	**4.77** *H-E*	**1.41** *E*	**0.005** *S*	**316** *E*	**171** *E*	**46** *H-E*	**29** *E*	**33** *S-H*
	Canteloupes Norm		*4.10*	*0.50*	*3.50*	*0.40*	*2.90*	*0.40*	*0.009*	*120*	*80*	*30*	*12*	*28*
No Fish Sh!t	**3767280**		**2.78** *D*	**0.31** *L-D*	**2.46** *D*	**0.54** *H*	**3.04** *S*	**0.99** *E*	**0.006** *S*	**324** *E*	**122** *H-E*	**33** *S-H*	**13** *S*	**29** *S*
	Canteloupes Norm		*4.10*	*0.50*	*3.50*	*0.40*	*2.90*	*0.40*	*0.009*	*120*	*80*	*30*	*12*	*28*

Ratings: D = Deficient, L = Low, S = Sufficient, H = High, E = Excessive

FISH SH!T STUDIES

Fish Sh!t's broad spectrum of microbes provide benefits for every stage of the plant's life from seed to harvest. In a recently completed study performed by Dr. James White, Professor of Plant Pathology at The Rutgers University Department of Plant Biology, Fish Sh!t was proven to effectively enhance the growth of roots and root hairs in seedlings. Microscopy work suggests Fish Sh!t is an extremely powerful biostimulant which enhances the activity of endophytic microorganisms and stimulates the rhizophagy cycle, leading to an observed increase in root and root hair growth. (Table 5, Pictures 1 – 6; Rutgers). This study provides evidence that Fish Sh!t can be used to enhance the growth of seedlings, which will lead to healthier, more vigorous, robust, plants; resulting in increased yields at harvest**.**

TABLE 5

Seedling	Fish Sh!t Application Rate ml per gallon	Germination Rate	Gravitropic Response	Root Length	Root hairs
Clover (Control)	N/A	83%	1	+	-
Clover (Test)	10	93%	4	+++	+++
Bluegrass (Control)	N/A	80%	2	+	-
Bluegrass (Test)	10	83%	7	+++	+++
Soybean (Control)	N/A	83%	5	+	+
Soybean (Test)	10	88%	8	++	++

ILLUSTRATION 1

Clover - Abundant root hairs (arrow) are present on roots treated with Fish Sh!t

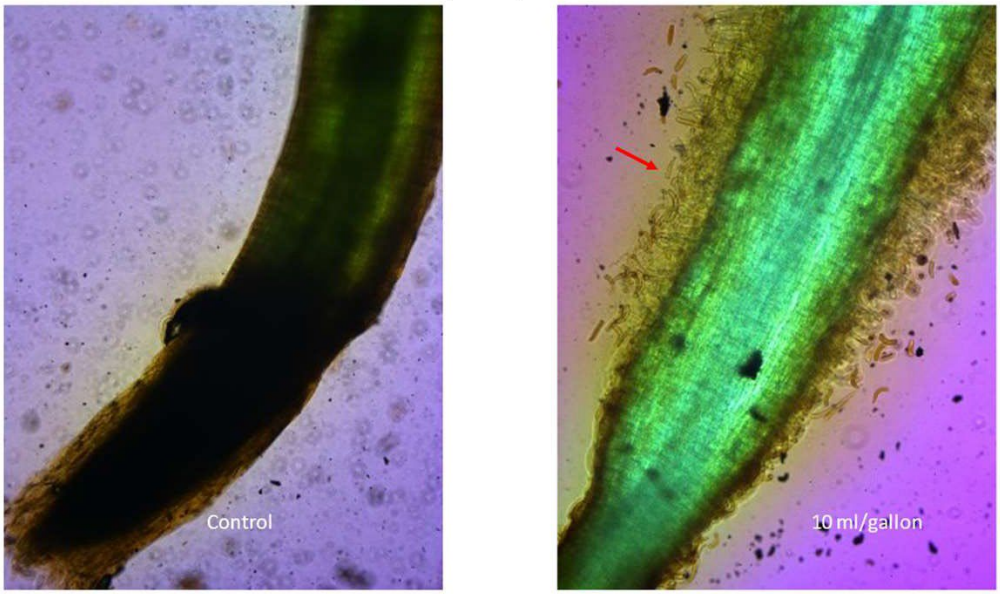


ILLUSTRATION 2

Stimulation of Root and Root Hair Growth in Clover Seedlings Through Application of 10 ml/gallon Fish Sh!t

ILLUSTRATION 3

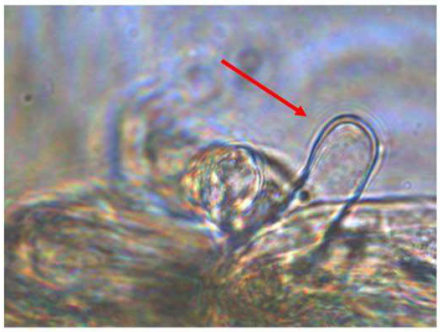
Bluegrass - Abundant root hairs (arrow) are present on roots treated with Fish Sh!t

ILLUSTRATION 4

Stimulation of Root and Root Hair Growth in Bluegrass Seedlings Through Application of 10 ml/Gallon Fish Sh!t

ILLUSTRATION 5

Soybeans - Abundant root hairs (arrow) are present on roots treated with Fish Sh!t

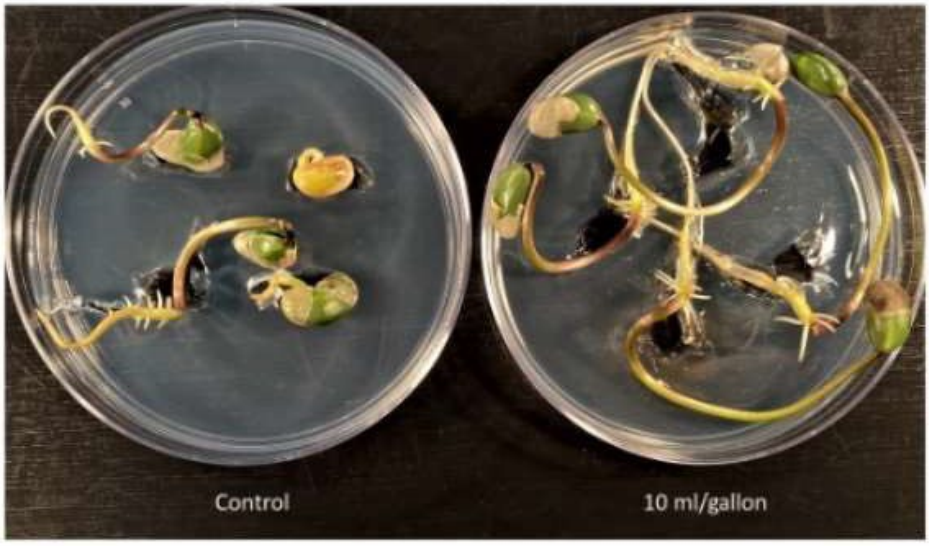


No, or very few, bacteria were seen in the root hairs (arrow) of non-treated soybean seedlings.

Abundant bacteria (arrow) were seen in the root hairs of soybean seedlings treated with Fishsh!t.

ILLUSTRATION 6

Stimulation of Root and Root Hair Growth in Soybean Seedlings Through Application of 10 ml/gallon Fish Sh!t



FISH SH!T ONGOING TRIALS AND CERTIFICATIONS

Fish Sh!t is an OMRI, USDA BIOPREFERRED, CDFA, and CFIA certified organic product and is manufactured by Fish Head Farms in a closed-loop aquaponic system, utilizing a patented and proprietary processes. Fish Sh!t is 100% organic, providing farmers with a product that can be used with either organic or synthetic inputs; allowing it to be combined with any synthetic input during application, while maintaining the integrity of both Fish Sh!t and other nutrients or amendments.

Fish Sh!t has been tested in multiple controlled trials in various agricultural markets, with the same results regardless of the crop or the plant. Increased yields and better quality end-products are consistent results for Fish Sh!t test groups vs control groups. All testing has been done, regardless of market, by independent farmers, growers, agronomists, etc.

Ongoing studies are being performed with Fish Sh!t in field testing as well as university testing, in order to provide farmers information on various agricultural crops' yields and quality as well as disease resistance, drought tolerance, pest resistance, and remediation of heavy metal uptake into plants.

CONCLUSION

Fish Sh!t is a unique and innovative soil amendment that offers a range of benefits to plants and soil. With over 4,000 distinct and specific microbes, Fish Sh!t is designed to promote healthy plant growth and development as well as improve soil structure. Fish Sh!t is a unique soil amendment that has proven effective in enhancing yields and improving product quality in row crops as well as specialty crops. Containing the most robust biology available in the market, Fish Sh!t's broad spectrum of microbes provide benefits for every stage of the plant's life, from seed to harvest. Fish Sh!t is also 100% organic and is certified by multiple organizations, which

assures farmers of its quality and safety. In order to provide additional value to the farming industry, ongoing trials with Fish Sh!t are being conducted. With its proven efficacy, Fish Sh!t is an important tool for farmers to improve crop yields and profitability.

Literary References

Thaler, E. A., Kwang, J. S., Quirk, B. J., Quarrier, C. L., & Larsen, I. J. (2022). Rates of historical anthropogenic soil erosion in the Midwestern United States. *Earth's Future*, 10, e2021EF002396. https://doi.org/10.1029/2021EF002396

Schnitkey, G., N. Paulson, C. Zulauf, K. Swanson and J. Baltz. "Fertilizer Prices, Rates, and Costs for 2023." farmdoc daily (12):148, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, September 27, 2022. https://farmdocdaily.illinois.edu/2022/09/fertilizer-prices-rates-and-costs-for-2023.html

Shelby Myers Rising Fuel Costs Continue to Impact Farmers https://www.fb.org/market-intel/rising-fuel-costs-continue-to-impact-farmers

Study Group References

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