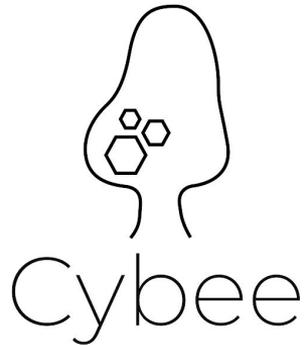


Worcester County Garden Club  
Presentation  
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**Northeast**  
Sustainable Agriculture  
Research and Education

# Improving Soil Tilth and Productivity with Mycorrhizal and Saprophytic Fungi

By Matthew Harhai







Shaggy Mane, *Coprinus comatus*

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Blewit, *Collybia nuda*

H.E. Bigelow & A.H. Sm.



Parasol, *Macrolepiota procera*



Date collected	sample ID	treatment	rep	soil grams	volume sampled cm3	bulk density
3/29/2022	PT1	Parasol	1	50	47.88	1.04
3/29/2022	PC1	Control	1	46	47.88	0.96
3/29/2022	PT2	Parasol	2	44	47.88	0.91
3/29/2022	PC2	Control	2	43	47.88	0.89
3/29/2022	PT3	Parasol	3	51	47.88	1.06
3/29/2022	PC3	Control	3	51	47.88	1.06
3/29/2022	BT1	Blewit	4	49	47.88	1.02
3/29/2022	BC1	Control	4	45	47.88	0.93
3/29/2022	BT2	Blewit	5	43	47.88	0.89
3/29/2022	BC2	Control	5	54	47.88	1.12
3/29/2022	BT3	Blewit	6	47	47.88	0.98
3/29/2022	BC3	Control	6	49	47.88	1.02
3/29/2022	ST1	Shaggy Mane	7	51	47.88	1.06
3/29/2022	SC1	Control	7	44	47.88	0.91
3/29/2022	ST2	Shaggy Mane	8	46	47.88	0.96
3/29/2022	SC2	Control	8	47	47.88	0.98
3/29/2022	ST3	Shaggy Mane	9	45	47.88	0.93
3/29/2022	SC3	Control	9	45	47.88	0.93



<b>3/29/2023</b>	<b>Sample ID</b>	<b>Treatment</b>	<b>Rep</b>	<b>Soil Grams</b>	<b>Volume Sampled cm3</b>	<b>Bulk Density</b>
<b>3/29/2023</b>	PT1	Parasol	1	37	47.88	0.77
<b>3/29/2023</b>	PC1	Control	1	66	47.88	1.37
<b>3/29/2023</b>	PT2	Parasol	2	42	47.88	0.87
<b>3/29/2023</b>	PC2	Control	2	50	47.88	1.04
<b>3/29/2023</b>	PT3	Parasol	3	38	47.88	0.79
<b>3/29/2023</b>	PC3	Control	3	69	47.88	1.44
<b>3/29/2023</b>	BT1	Blewit	4	33	47.88	0.68
<b>3/29/2023</b>	BC1	Control	4	57	47.88	1.19
<b>3/29/2023</b>	BT2	Blewit	5	31	47.88	0.64
<b>3/29/2023</b>	BC2	Control	5	57	47.88	1.19
<b>3/29/2023</b>	BT3	Blewit	6	42	47.88	0.87
<b>3/29/2023</b>	BC3	Control	6	46	47.88	0.96
<b>3/29/2023</b>	ST1	Shaggy Mane	7	44	47.88	0.91
<b>3/29/2023</b>	SC1	Control	7	45	47.88	0.93
<b>3/29/2023</b>	ST2	Shaggy Mane	8	50	47.88	1.04
<b>3/29/2023</b>	SC2	Control	8	52	47.88	1.08
<b>3/29/2023</b>	ST3	Shaggy Mane	9	46	47.88	0.96
<b>3/29/2023</b>	SC3	Control	9	39	47.88	0.81



Averages 2022		Bulk Density Grams / cm <sup>3</sup>
	PT	1
	PC	0.97
	BT	0.96
	BC	1.02
	ST	0.98
	SC	0.94
Averages 2023		Bulk Density Grams / cm <sup>3</sup>
	PT	0.81
	PC	1.28
	BT	0.73
	BC	1.11
	ST	0.97
	SC	0.94

From 2022 to 2023:

Parasol Treatment:

A 19 % average reduction in soil density.

Parasol Control:

A 25 % average increase in soil density.

Blewit Treatment:

A 25 % average reduction in soil density.

Blewit Control:

A 9 % average increase in soil density.

Shaggy Mane Treatment:

From an average of .98 bulk density to .97 bulk density.

Shaggy Mane Control:

No change from an average of .94 bulk density to .94 bulk density.



<b>3/22/2023</b>	<b>Sample ID</b>	<b>Treatment</b>	<b>Rep</b>	<b>Soil Grams</b>	<b>Volume Sampled cm3</b>	<b>Bulk Density</b>
<b>3/22/2024</b>	PT1	Parasol	1	45	47.88	0.93
<b>3/22/2024</b>	PC1	Control	1	48	47.88	1.002
<b>3/22/2024</b>	PT2	Parasol	2	48	47.88	1.002
<b>3/22/2024</b>	PC2	Control	2	48	47.88	1.002
<b>3/22/2024</b>	PT3	Parasol	3	45	47.88	0.93
<b>3/22/2024</b>	PC3	Control	3	50	47.88	1.04
<b>3/22/2024</b>	BT1	Blewit	4	47	47.88	0.98
<b>3/22/2024</b>	BC1	Control	4	48	47.88	1.002
<b>3/22/2024</b>	BT2	Blewit	5	56	47.88	1.16
<b>3/22/2024</b>	BC2	Control	5	54	47.88	1.12
<b>3/22/2024</b>	BT3	Blewit	6	37	47.88	0.77
<b>3/22/2024</b>	BC3	Control	6	53	47.88	1.1
<b>3/22/2024</b>	ST1	Shaggy Mane	7	48	47.88	1.002
<b>3/22/2024</b>	SC1	Control	7	52	47.88	1.08
<b>3/22/2024</b>	ST2	Shaggy Mane	8	47	47.88	0.98
<b>3/22/2024</b>	SC2	Control	8	54	47.88	1.12
<b>3/22/2024</b>	ST3	Shaggy Mane	9	49	47.88	1.02
<b>3/22/2024</b>	SC3	Control	9	53	47.88	1.1



**Comparing the treatment sites of 2023, to the treatment sites of 2024:** increase in soil density in all but two of the treatment sites. In BT3 the density decreased from .87 grams/cm<sup>3</sup> to .77 grams/cm<sup>3</sup>, and in ST2 the density decreased from 1.04 grams/cm<sup>3</sup> to .98 grams/cm<sup>3</sup>.

**Comparing the control sites of 2023 to the treatment sites of 2024:** decrease in density of the Parasol Controls from an average of 1.28 grams/cm<sup>3</sup> to 1.01 grams/cm<sup>3</sup>

The blewit controls from 2023 to 2024 shows a decrease in density in two of the three samples.

The shaggy mane controls from 2023 to 2024 shows an increase in density of all of the controls, from an average of .94 grams/cm<sup>3</sup> to 1.1 grams/cm<sup>3</sup>.



Averages 2024		Bulk Density Grams / cm <sup>3</sup>
	PT	0.95
	PC	1.01
	BT	0.97
	BC	1.07
	ST	1
	SC	1.1

Shaggy Mane Treatment:

A 2% average increase in soil density.

Shaggy Mane Control:

A 15% average increase in soil density.

From 2022 to 2024:

Parasol Treatment:

A 5% average reduction in density

Parasol Control:

A 4% average increase in density

Blewit Treatment:

A 2% average increase in soil density

Blewit Control:

A 5% average increase in soil density.



Reasons for decreases from 2022 to 2023:

Added mulch, benefits of blewit and parasol inoculations.

Possibility that the mushroom cultures expired. Mulch could have attracted worms which aerated the soil and contributed to the density decrease.

Reasons for density increases (nearly across all samples) from 2022 to 2024:

No added mulch, and organic material.

Intense rainfall, approximately two weeks prior to sampling in 2024.

Possible revised experiment...