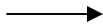


# **Do Metals in Biosolids Pose a Risk to Human Health? Current Research**

B. Hale, D. Chan, L. Vasiluk, J. Forkes, J.  
Hargreaves, P. Smith

Department of Land Resource Science

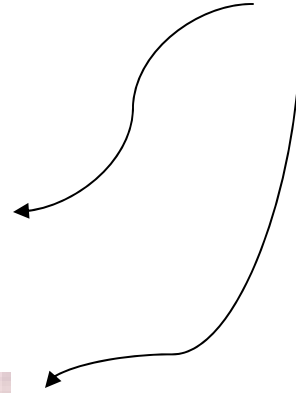




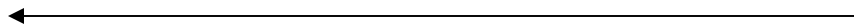
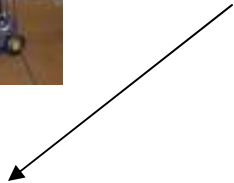
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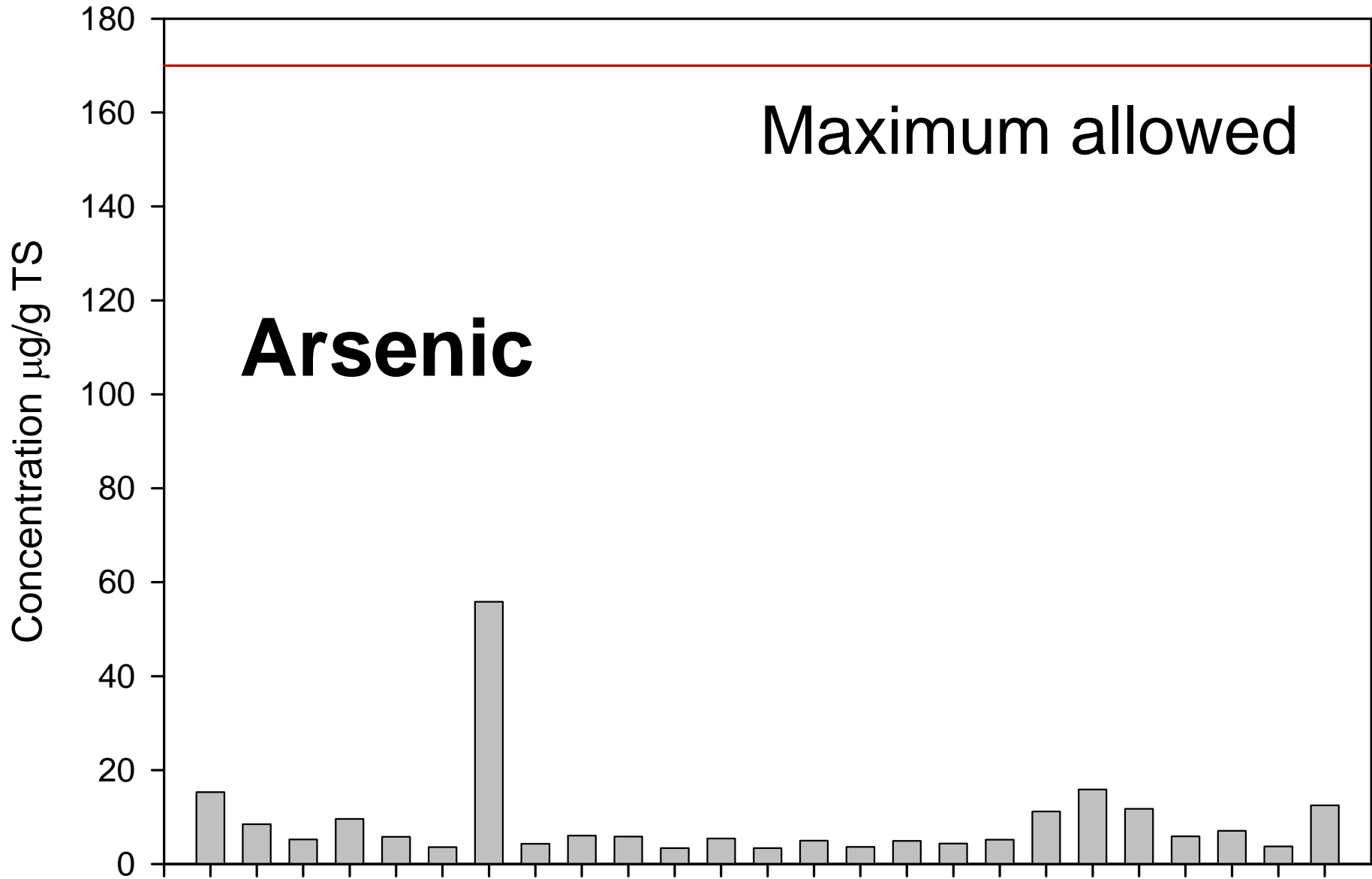


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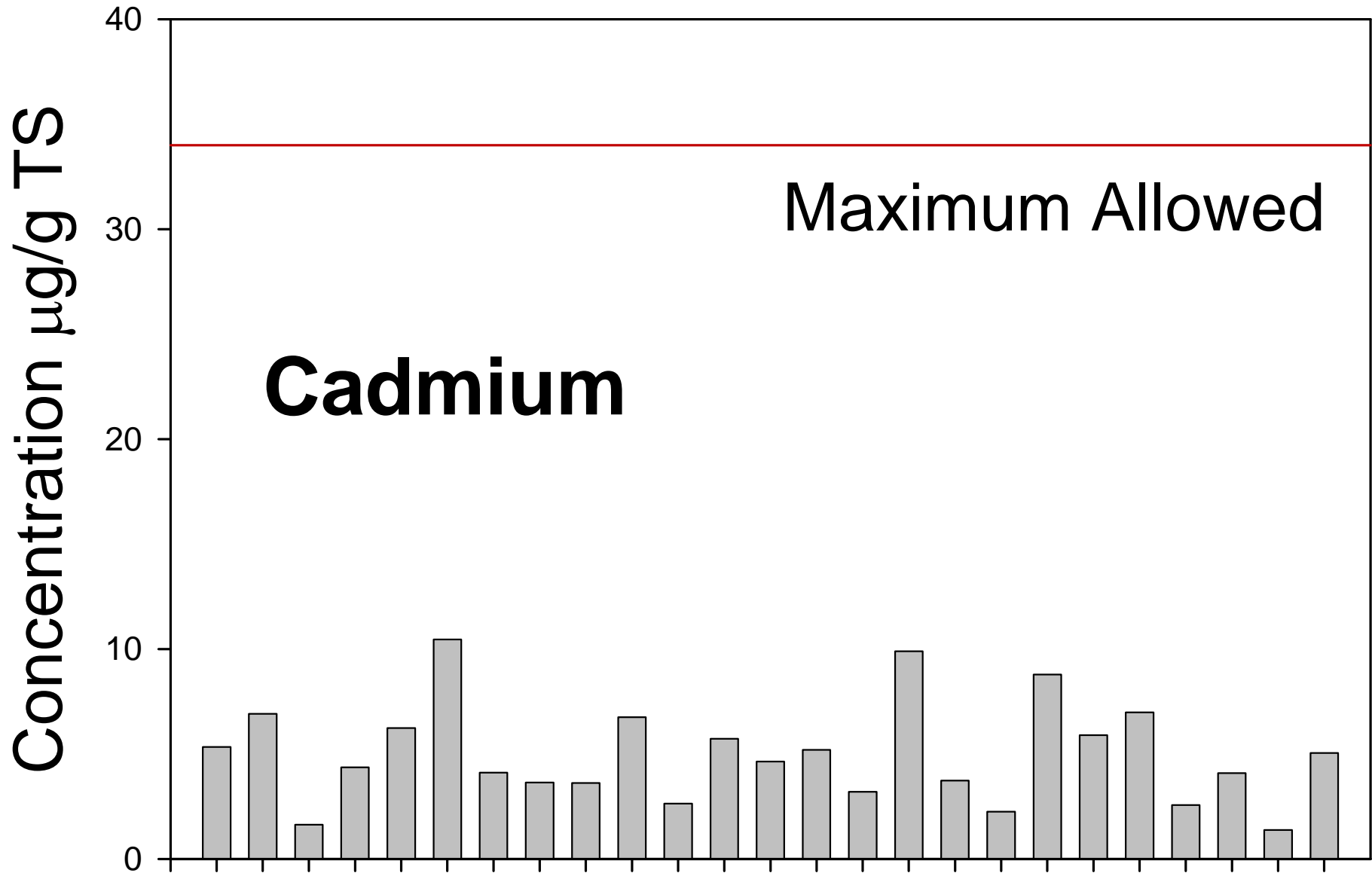


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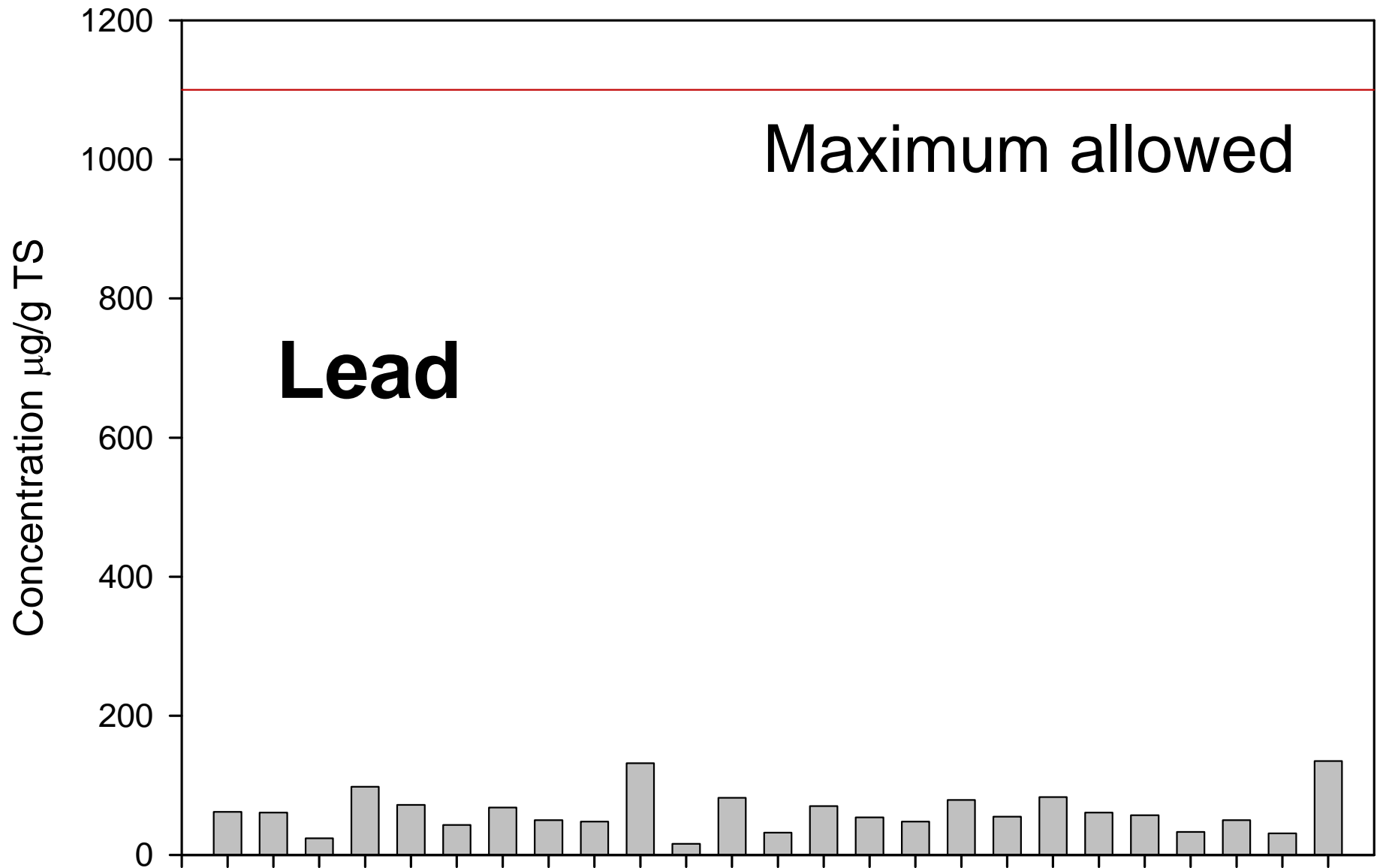
# From the STP



# From the STP



# From the STP



# From Biosolids to Soils

	<b>Average Soil Concentration</b>	<b>Increase in Soil Concentration per 5 years</b>
<b>Arsenic</b>	7 mg/kg	0.03 mg/kg (<1%)
<b>Cadmium</b>	0.8 mg/kg	0.009 mg/kg (~1%)
<b>Lead</b>	15 mg/kg	0.18 mg/kg (<2%)

# From Soil to Food

	<b>Soil Concentration</b>	<b>Food Concentration</b>	<b>Transfer</b>
<b>Arsenic</b>	7 mg/kg	0.4 mg/kg	6%
<b>Cadmium</b>	0.8 mg/kg	0.5 mg/kg	60%
<b>Lead</b>	15 mg/kg	1.2 mg/kg	8%

Efroymsen et al., 2001 ET&C 20:2561

# From Food to Consumer

<b>Food</b>	<b>Assay</b>	<b>Transfer</b>
Lettuce 4 mg Cd/kg	to Rabbits	< 1%
	to Caco-2 cells	< 1%
Grain 2.75 mg Cd/kg	to Mice	< 2%
	to Caco-2 cells	<< 1%

# From Soil/Dust to Consumer

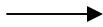
	<b>Total Metal</b>	<b>Digestable Metal</b>	<b>Transfer</b>
<b>Arsenic</b>	12.7 mg/kg	0 mg/kg	0 %
<b>Cadmium</b>	?	?	
<b>Lead</b>	2900 mg/kg	123 mg/kg	< 1%

Hale et al., in progress

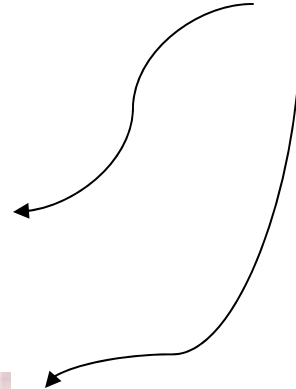
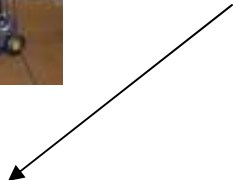
# ..and how about your house?

	<b>House Dust</b>	<b>Garden Soil</b>	<b>HD &gt; GS</b>
<b>Arsenic</b>	7.3 mg/kg	3.0 mg/kg	2.4 x
<b>Cadmium</b>	6.5 mg/kg	0.30 mg/kg	22 x
<b>Lead</b>	405 mg/kg	65 mg/kg	6.2 x

Rasmussen et al., 2001 Sci Tot Env 267:125



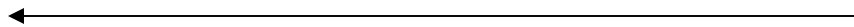
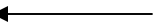
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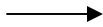
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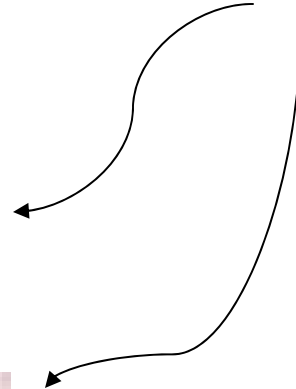
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3



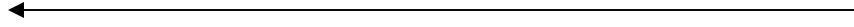
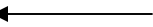
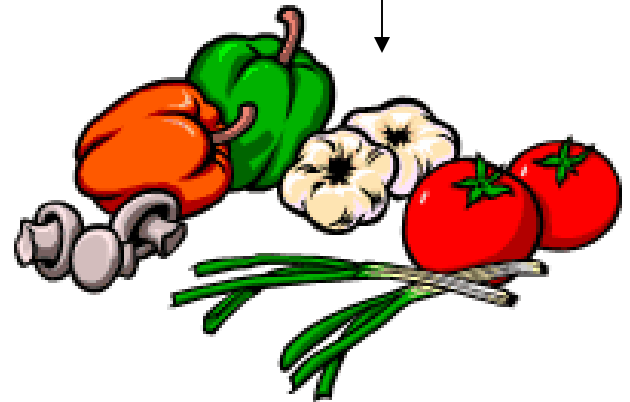
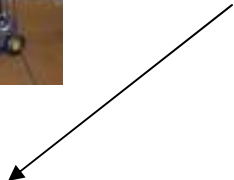
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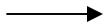
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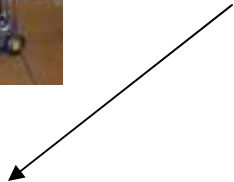
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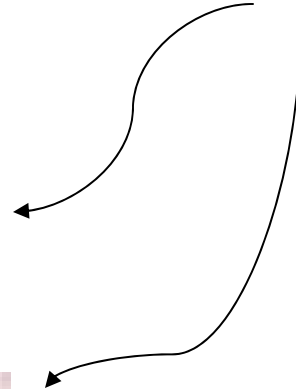
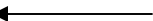
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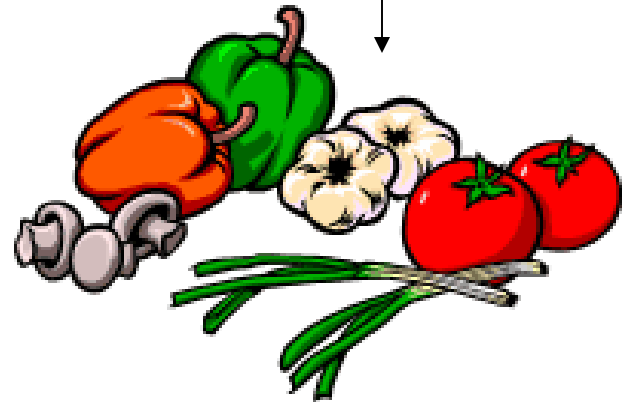
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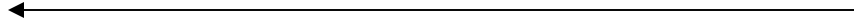
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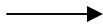


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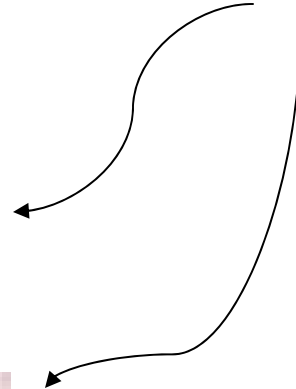
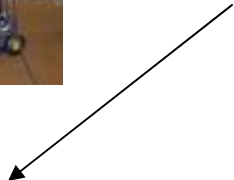


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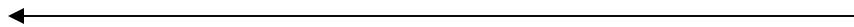
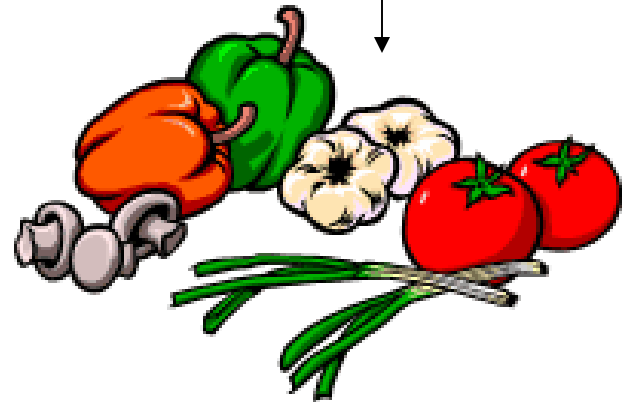
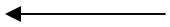
102%



60%



?



2%



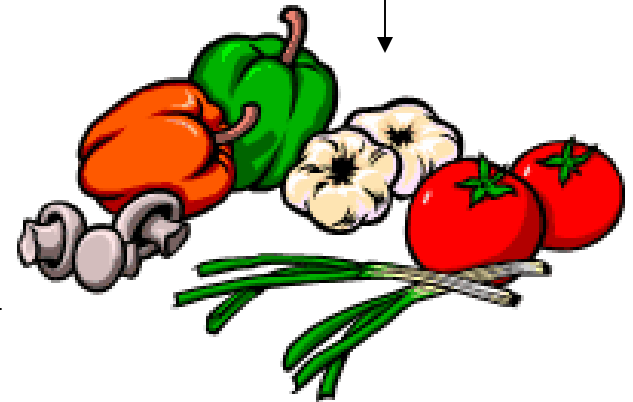
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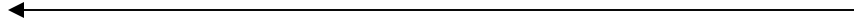
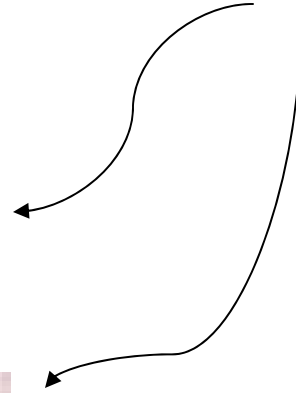
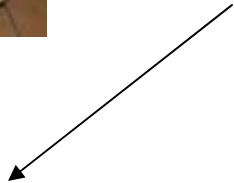
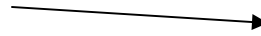
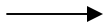
22 x



60%

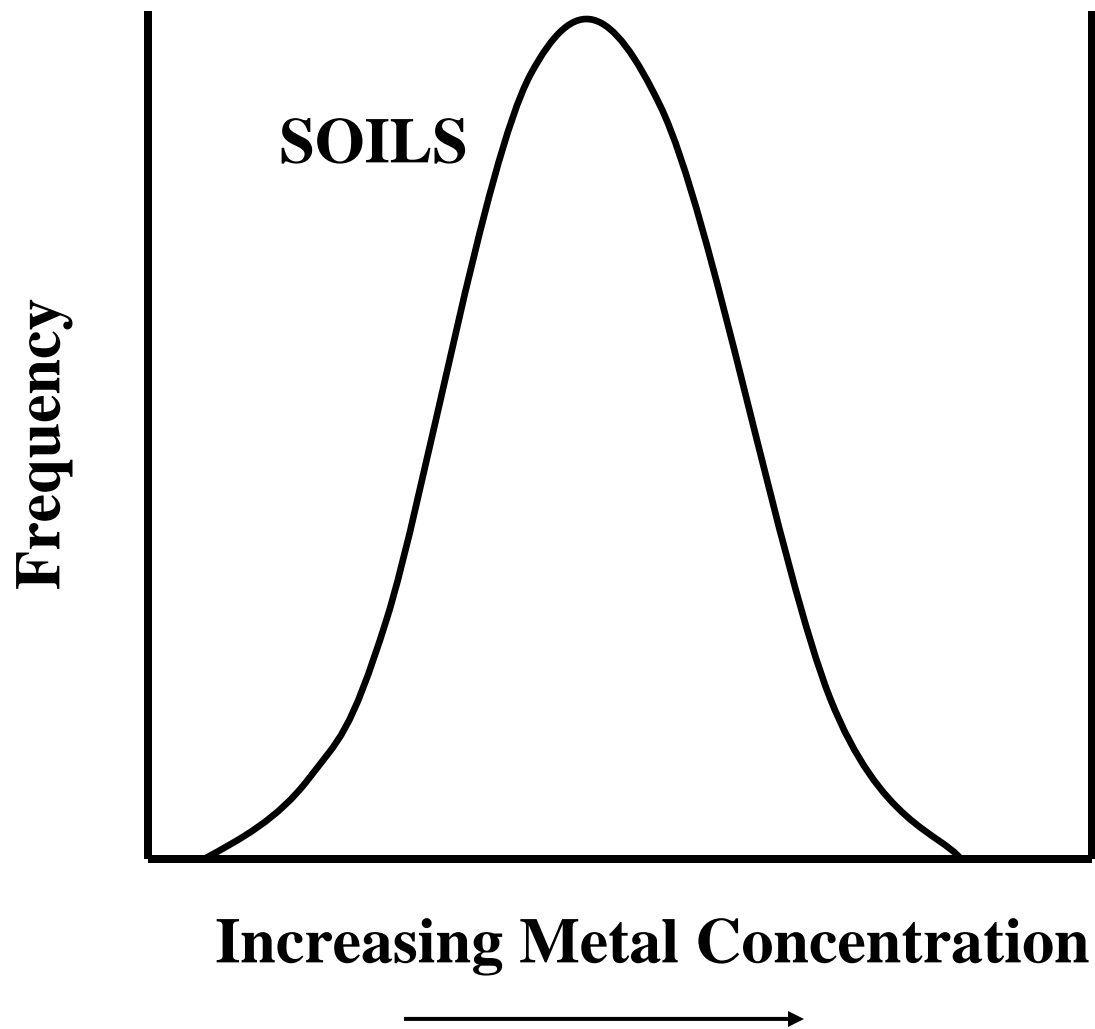


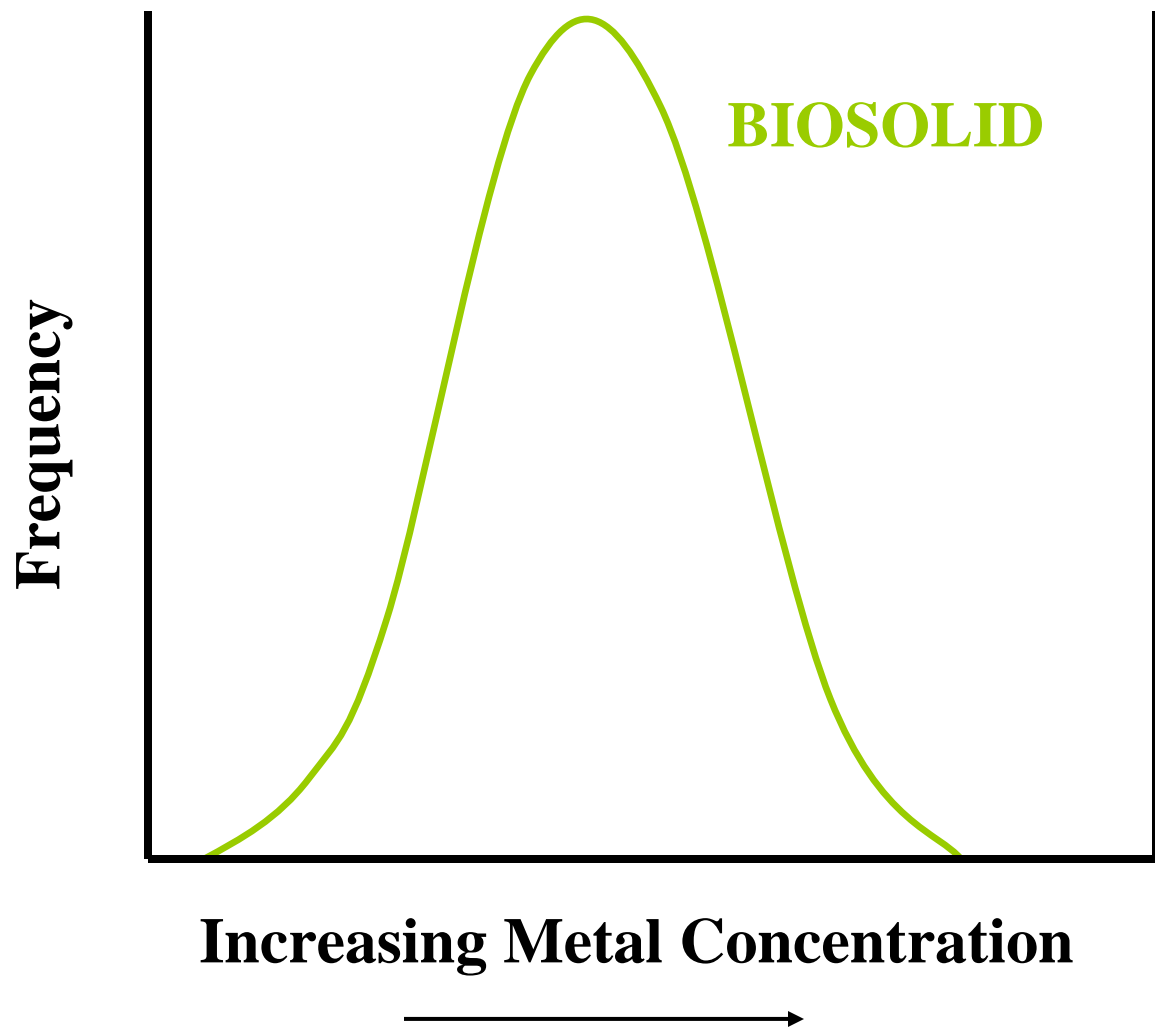
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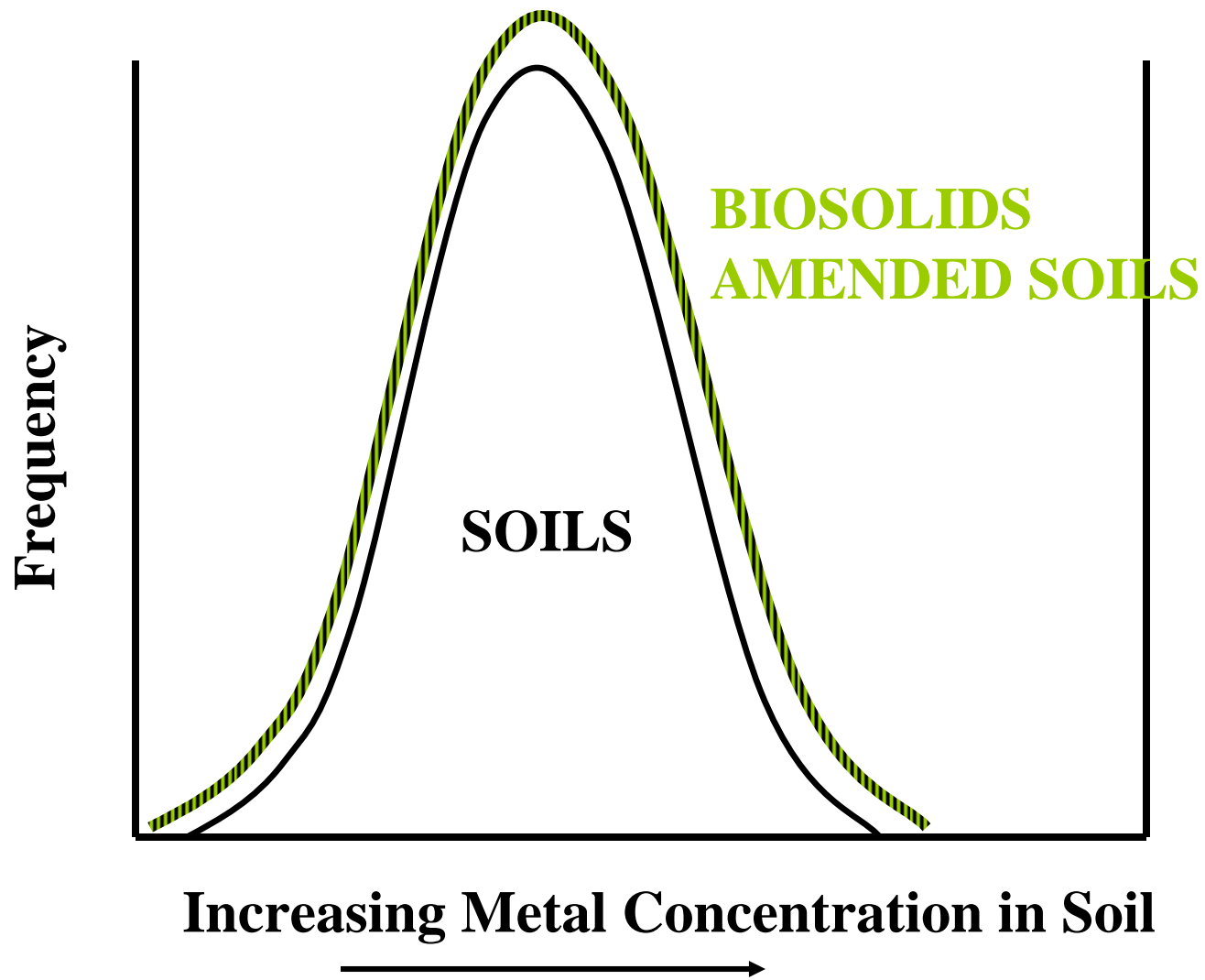


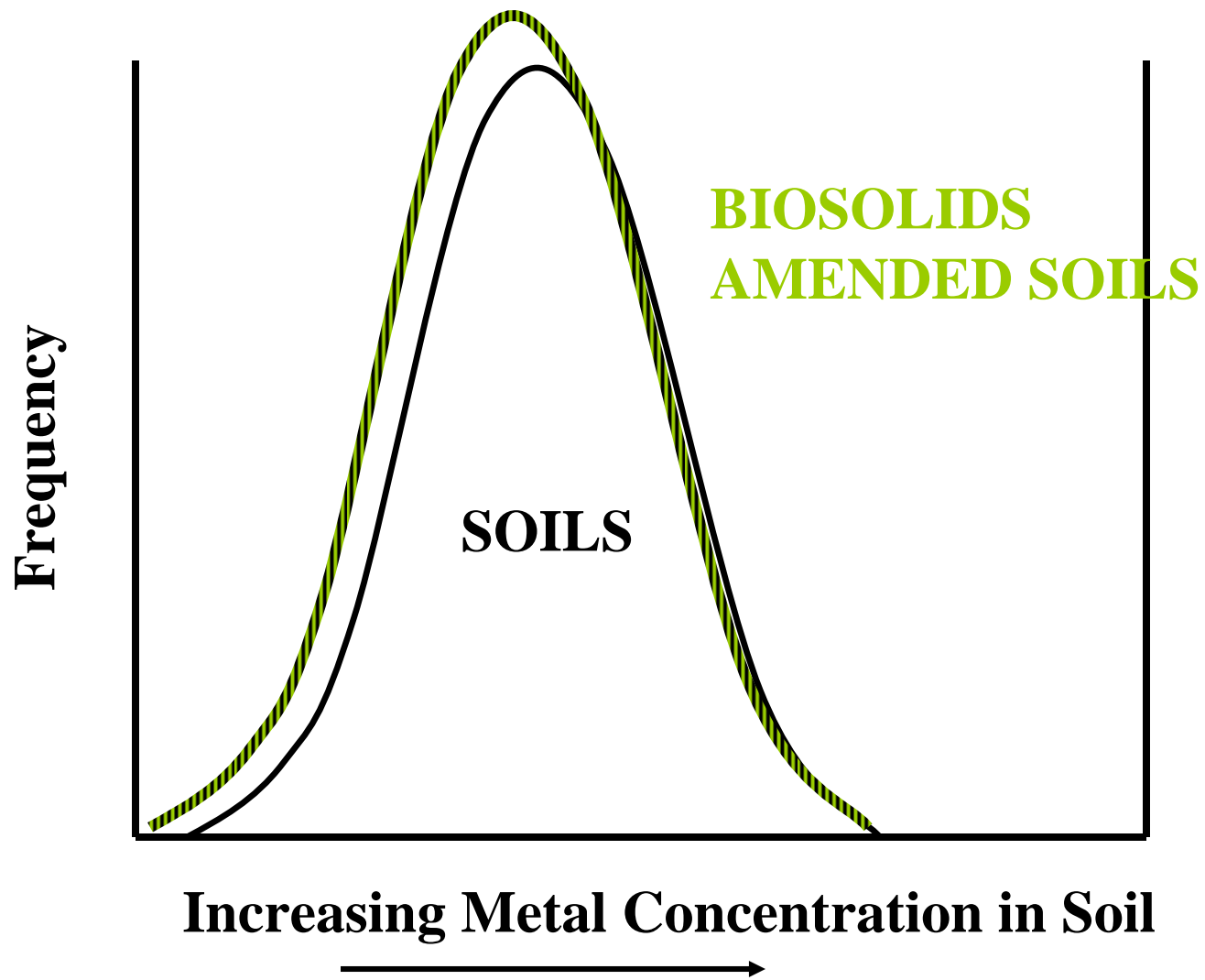
# What's next?

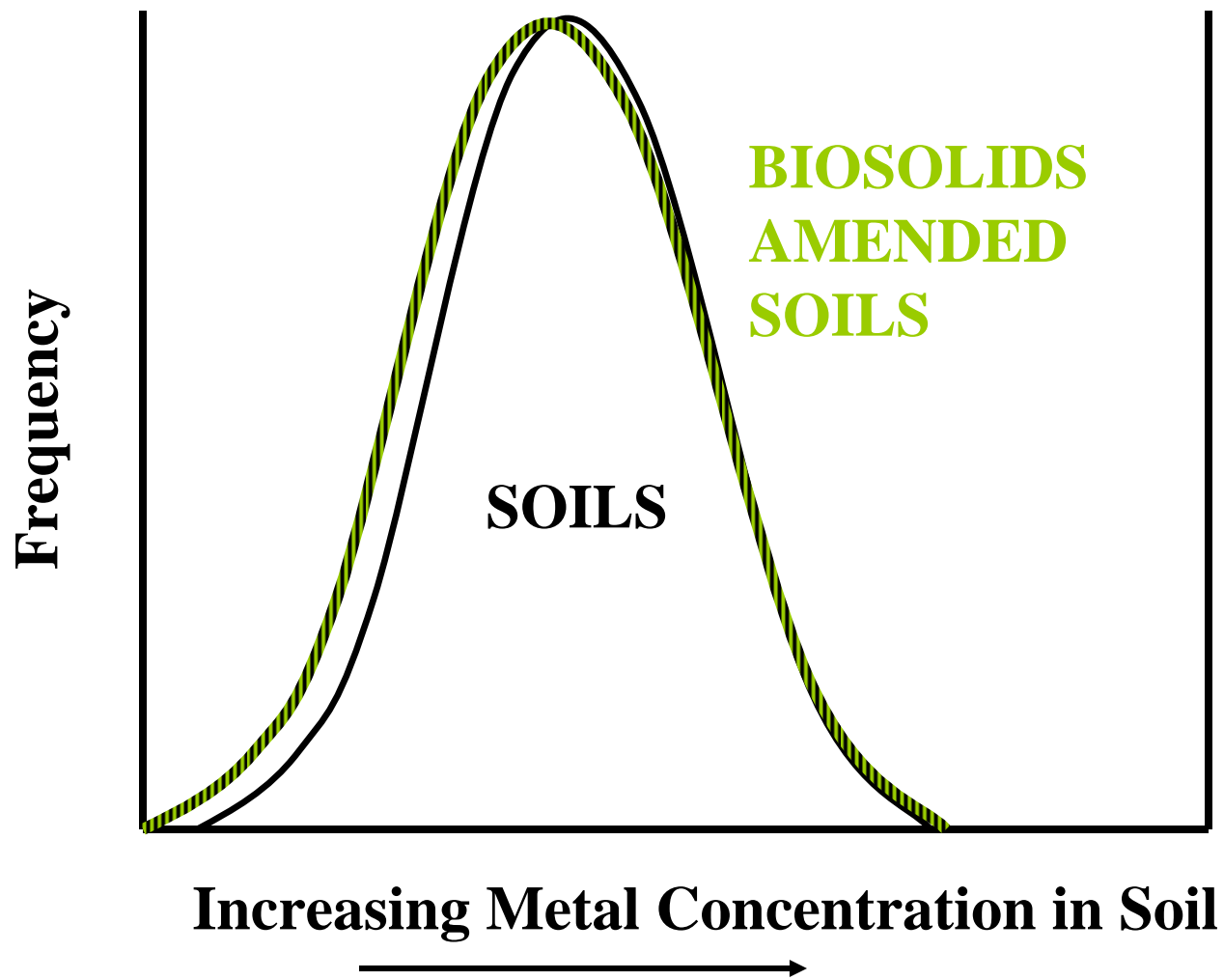
Calculate the probability of measurable metal increase in Ontario agricultural soils as a result of application of Ontario STP materials











Thank you!

