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The Effect of Wetting Agents and Plant Growth Regulators on Microbial Growth in Culture Medium

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Introduction

This is a preliminary study that was done to assess the impact of selected wetting agents and plant growth regulators on bacterial growth in culture medium under laboratory conditions. Seven wetting agents and three plant growth regulators were mixed at four concentrations with the growth medium that was inoculated with microorganisms extracted from soil. The bacterial growth was monitored over time by measuring the turbidity of the medium as an indicator of growth. More information on details of the study is given below.

Materials & Methods

We used a generic growth medium for total heterotrophic bacteria called nutrient broth. The broth contained antifungal additive (nystatin) to prevent fungal interference on bacterial growth. The growth assay was prepared by mixing the various ingredients in a 24-well culture plate as shown in Figure 1. The total assay volume was 1 mL (1000 μ L). Each product was added at four levels: 0 (positive control), 10, 20 and 50 μ L. The concentrations corresponded to 0, 1, 2 and 5%. The positive control included everything but the product. The negative control, on the other hand, received everything but the microorganisms. After mixing all the ingredients, the plates were shaken in an incubator at 25°C at 150 rpm to facilitate aeration. Two separate plates were set up for the two sampling times, which were 24 and 48 hrs.

Measurements for turbidity were taken with a spectrophotometer at 600 nm. All treatments were set-up in duplicate. Sterile phosphate buffer was used to extract microorganisms from soil to be used as inoculants. Some of the products contain surfactants that turned the medium milky upon addition. This interfered with the measurement of turbidity initially. To correct for this, the medium was centrifuged at high speed to separate the bacteria that settled at the bottom. The surfactant was then removed, and the bacteria were subsequently resuspended in sterile phosphate buffer for measurement. The absorbance from the negative control was subtracted from the absorbance values of the rest. Analysis of variance was conducted in JMP Pro 13 to compare the mean absorbance values among treatments and concentrations.

Summary of Results & Recommendation

- Dispatch, Fleet, Oars, Prevade, Vivax, Proxy and Trimmit inhibited bacterial growth as compared to the positive control (Table 1; see below). Their impact was statistically significant ($P < 0.0001$).
- Similarly, Anuew, Proxy and Trimmit inhibited bacterial growth as compared to the positive control (Table 1). Their impact was also statistically significant ($P < 0.0001$).
- Sixteen 90 did not show any negative impact on bacterial growth whereas the impacts of Magnus and Anuew appeared to be only temporary.
- The effects of the wetting agents and plant growth regulators in a growth medium might not

be reflective of what will happen in soils where there are organic matter and soil particles that can minimize the impact.

- However, we recommend field based studies for the wettings agents and the plant growth regulators that completely inhibited microbial growth to further study their impacts not only on microbial growth but also their impact on microbial functions.

Table 1. Bacterial growth (as indicated by average absorbance reading) in response to wettings agents and plant growth regulators at four concentrations.

Product	Time	24 hr				48 hr			
		Concentration (parts per thousand-ppt)							
		0	10	20	50	0	10	20	50
		-----Mean absorbance-----							
Wetting agents	Dispatch	0.266	0.036	0.038	0.037	0.623	0.036	0.037	0.036
	Fleet	0.370	0.181	0.028	0.036	0.766	0.120	0.079	0.121
	Magnus	0.224	0.000	0.000	0.000	0.789	0.273	0.339	0.550
	Oars	0.399	0.036	0.043	0.037	0.680	0.078	0.039	0.037
	Prevade	0.442	0.038	0.043	0.044	0.768	0.032	0.039	0.060
	Sixteen 90	0.188	0.217	0.236	0.217	0.615	0.778	0.985	0.897
	Vivax	0.246	0.078	0.111	0.136	0.530	0.112	0.119	0.215
Plant growth regulators	Anuew	0.314	0.100	0.257	0.184	0.614	0.566	0.465	0.502
	Proxy	0.337	0.038	0.036	0.035	0.916	0.039	0.057	0.036
	Trimmit	0.388	0.017	0.039	0.000	0.598	0.018	0.150	0.006