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KGBI/Pathogen Death Wand Report

Background/Introduction

Initiating in March 2017, KGBI and The Pathogen Death Wand Company (PDW) have entered an agreement to test the performance of Pathogen Death Wand Light Strip against control grow conditions including six strains of Cannabis over an entire harvest cycle. The point of the experiment was to test the PDW versus normal grow conditions to prove or disprove the effectiveness of the PDW at controlling microbial growth in real world conditions. All testing was compliant with MED/METRC regulations and were submitted to laboratories through KGBI's retail license 403R-00113. The grow details and growing conditions were as follows:

- Indoor Grow
- Grow Room was appx 30' x 60' containing 4 rows of warehouse steel racking
- Each row had six sections of 4' x 8' racking, each section is separated by appx 30"
- Each section contained 24 plants
- Rows 2 and 3 were duplicates - a Control and PDW Treatment test
- 6 different strains grown in Row 2 "Control" and in Row 3 "PDW" natural treatment
- Temperature range during grow test was 70-75 degrees F
- Average Humidity ranged from 50-60%
- Flower Room grow light cycle was 12 on and 12 off
- Watered / fed every 3 days - Amount of water varies by plant / strain - grower's judgment
- 1000W Phantom DE HPS Lights

Experimental Setup

Row 2 results represent the control groups. Row 3 results represent the PDW treatment groups.



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TYM tests were submitted to PhytaTech from grow weeks 1-8 for Row 2 and from grow weeks 2-9 for Row 3. Samples drawn randomly (1gm trim leaf's for each weekly TYM testing) from each strains 4' x 8' grow area – 24 plants per area. All trimming done by the grows production manager. Each sample was bagged and tagged per the CO Metric system requirements. PhytaTech followed the normal total yeast and mold testing protocol subject to SOP-039. The Colorado Department of Public Health and Environment (CDPHE) has approved this testing protocol. Petrifilms were subsampled and plated, then allowed to grow/incubate at 27 degrees Celsius for a minimum of 72 hours. They were then counted and reported as cfu/g or colony forming units per gram.

During flower harvests, samples were also submitted for potency and terpene (chemotype) analysis. This was done for both Row 2 and Row 3 results both wet and after 1 week of curing (dry). Potency testing was done per SOP-020, which is also approved, by the CDPHE.

Results

Results for all yeast and mold testing are below for control strains (Row 2) and PDW treated groups (Row 3). Six strains were submitted for testing over the 10 weeks of the study: Pura Vida (PV), Kong, Sueno (SNO), White Widow (WW), Cheese (CHZ), Death Star (D*).

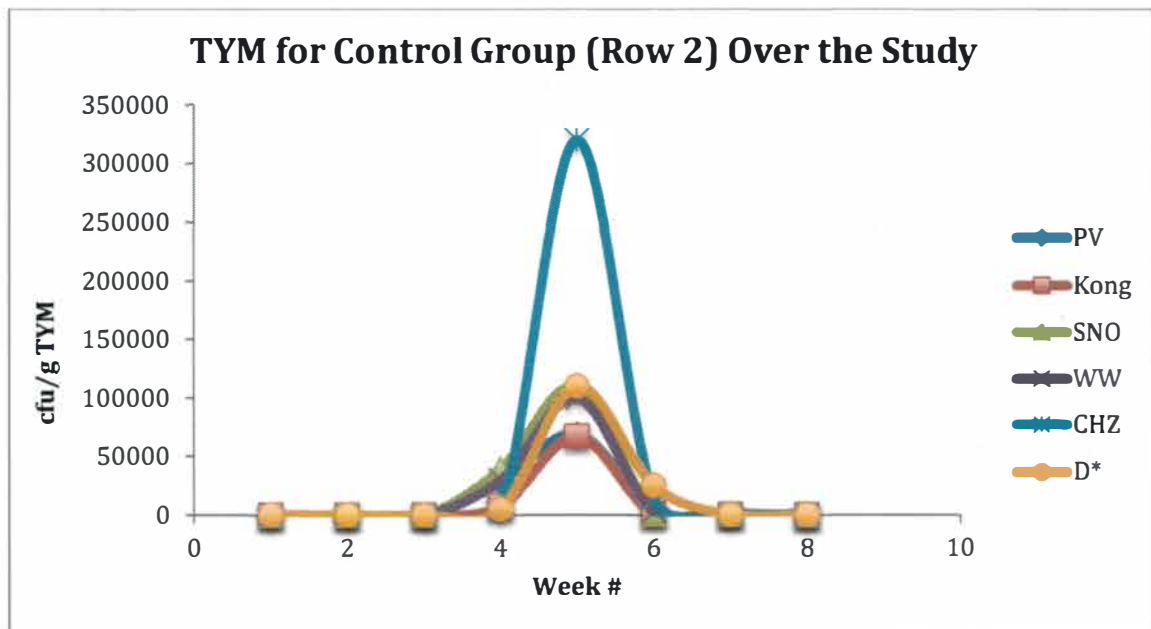


Figure 1. Control Yeast & Mold Counts

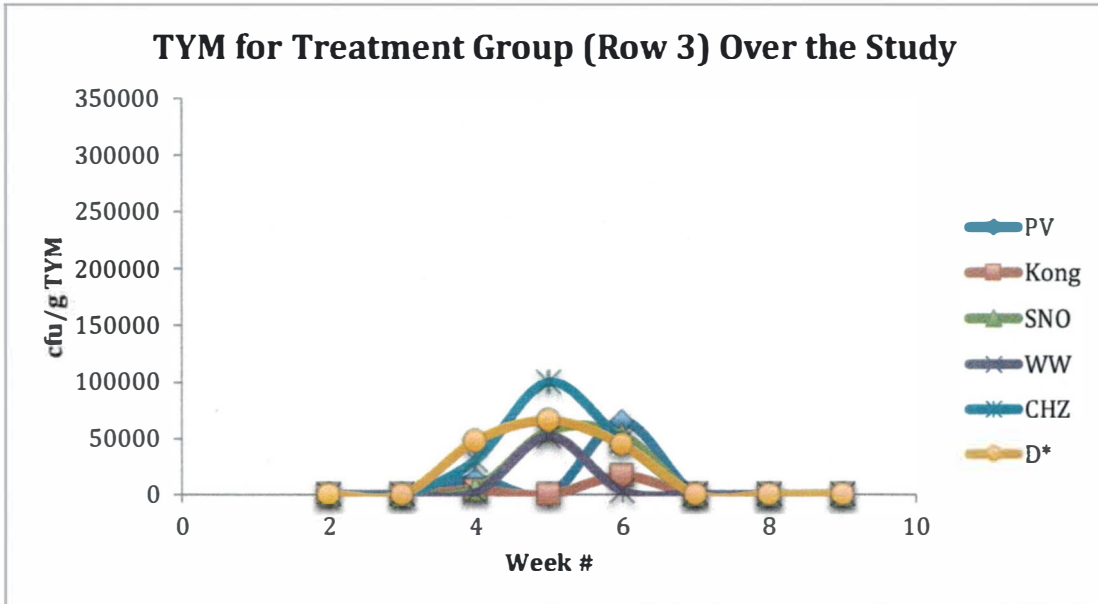


Figure 2. Treatment Yeast & Mold Counts

As seen in Figures 1 and 2, total yeast and mold communities started low during weeks 1-4 and slowly increased during plant lifecycle, peaking in weeks 5 or 6. This is typical for *Cannabis* grows as well as other plant lifecycles. These changes in microbial communities prompted a change in the treatment protocol. Row 3 samples have less absolute cfu/g values over than the Row 2 samples as seen in comparing Figure 1 and Figure 2.

Previously, in weeks 1-5, the PDW light strips were located 18-22 inches above the *Cannabis* crops and followed a 12-hour on cycle followed by a 12-hour off cycle. The PDW lights were lowered to a height of 6-8 inches before week 6 for all strains with the exception of D*. Two PDW strips were inserted underneath the canopy of the D* plants. After week 6, the PDW lights (both above and below canopy) were kept on 24 hours a day.

These changes had an effect of immediately dropping the rising TYM counts to mostly none detected (ND) in all six strains.

Figures 3-6 below exhibit the chemotype analysis for both control and treatment groups including both wet and fully cured (dry) flowers.

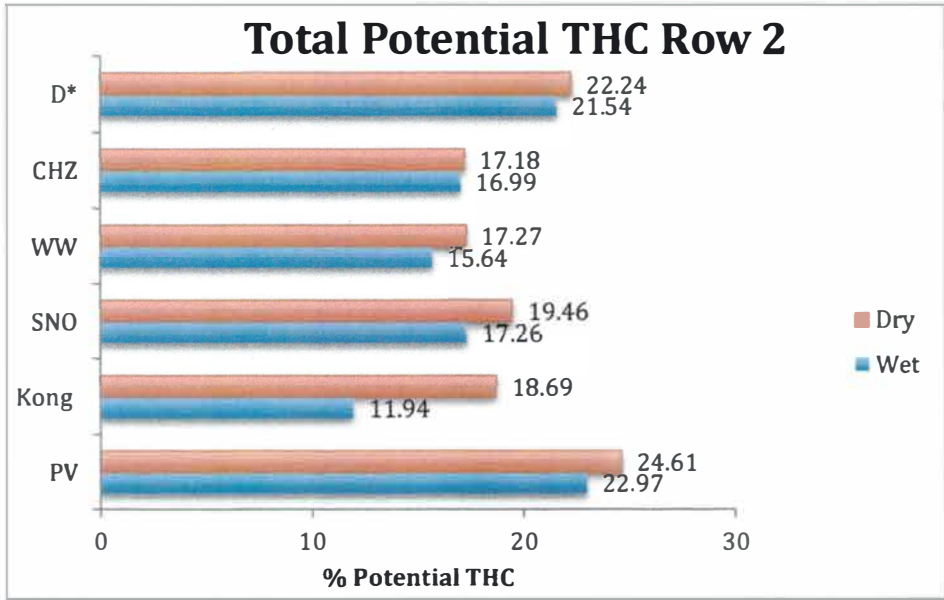


Figure 3. Control Potency Analysis

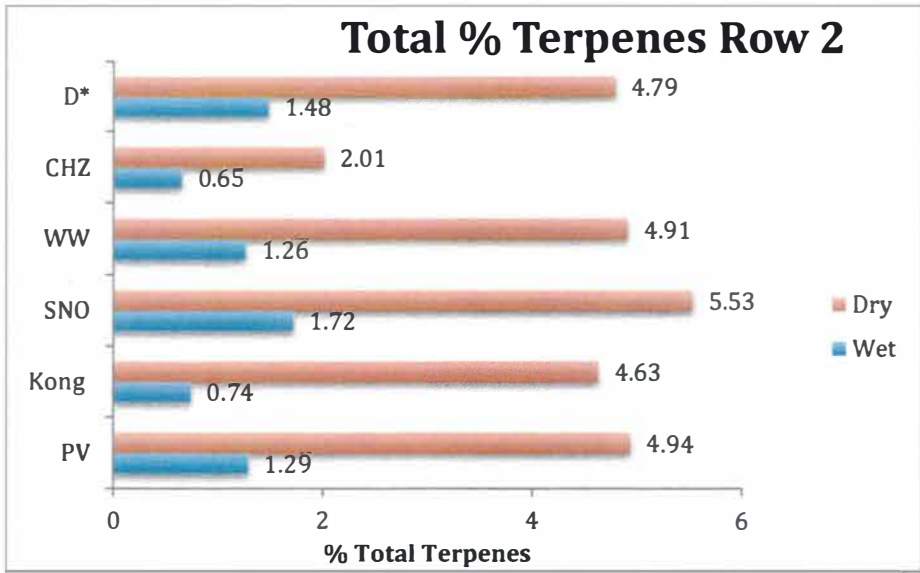


Figure 4. Control Terpene Analysis

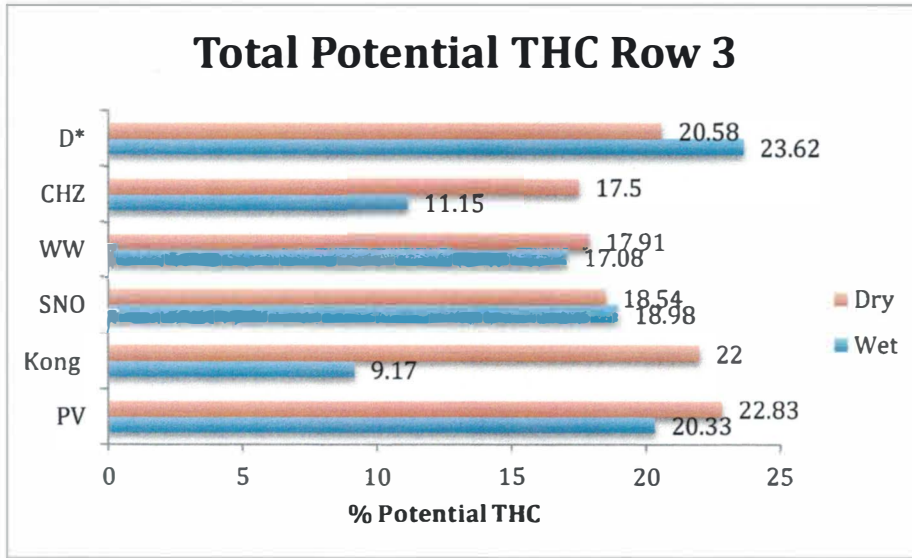


Figure 5. PDW Treatment Potency Analysis

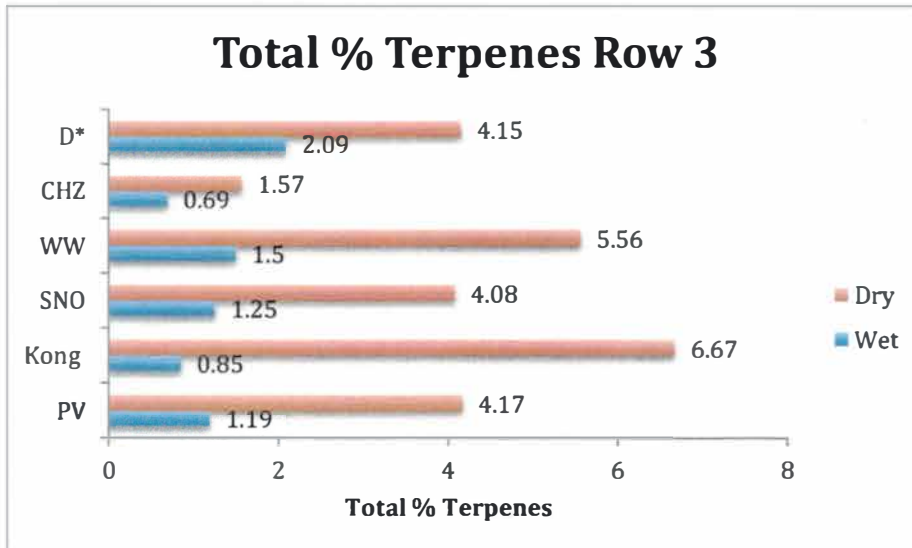


Figure 6. PDW Treatment Terpene Analysis

As can be seen in Figures 3-6, the chemotype analyses are comparable for control strains and for treatment strains. As expected, once cured (dried) the flowers exhibit higher terpene concentrations and slightly higher cannabinoid concentrations (THC).

Discussion

Treatment with PDW light strips are comparable to the standard industry practice of insecticide/fungicide treatments (see Appendix A). Using PDW strips at a height of 6-8 inches above plants, or both above and below plants, for all 24 hours of a day,




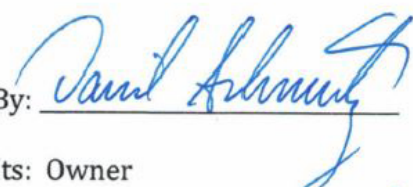
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are as effective as normal chemical treatments on *Cannabis* plants and flowers. Importantly, there are no deleterious effects of PDW strip treatments on *Cannabis* chemotype (potency and terpenes) as compared to control strains.




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The above report is deemed to be true and honestly evaluated. All testing protocols were followed according to approved SOPs and all growing conditions were done in a compliant and safe manner. The signatures below assert this is true.

Testing Facility-PhytaTech 405R-00011	Growing Facility - KGBI 403R-00113
By: 	By: 
Its: Laboratory Director	Its: Owner
Name Printed: <u>Stephen Golda</u>	Name Printed: <u>David Schwartz</u>
Date: <u>06.13.2017</u>	Date: <u>6/13/2017</u>

By: 
Its: Production Manager
Print: Nicholas Thompson
Date: 6/13/2017

By: Sean M. 
Its: Grower
Print: Sean Garcia⁷
Date: 6.13.2017

Appendix A - KGBI Protocol Insecticide/Fungicide Treatments for Control Group

Insecticides / Fungicides Used code	Brand Name Product	Treatment Type	Dosage per use ML/GAL
A =	Azamax	Insecticide	45
C =	Cease+	Fungicide	
N =	Nukem	I and F	120
P =	Pyganic 5.0	Insecticide	15
S+ =	Canicare Synergy+	I and F	120
Z =	Zerotol	Fungicide	37
W =	Bioworks	Insecticide	15

Additional Nutrients Used

Ionic Salts
 Humeric Acid
 Root Stimulants
 PH to 6.0
 NPK - Nitrogen, Phosphorus, Potassium
 Calcium
 Magnesium

Treatment Schedule for Insecticides and Fungicides Used during the Test

	ROW 2		ROW 3	
18-Mar	P-Z	I-F	-	
25-Mar	P-A	I-F	P-A	I-I
29-Mar	P-Z	I-F	P-A	I-I
31-Mar	-	-	-	-
3-Apr	A-Z	I-F	A	I
6-Apr	W	I	W	I
11-Apr	W	I	W	I
15-Apr	P	I	P	I
18-Apr	A-Z	I-F	P	I
23-Apr	A-P	I-I	P	I
24-Apr	Z	F	-	-
26-Feb	P-A	I-F	P-A	I-I

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28-Apr	Z	F	A	I
30-Apr	Z	F	P	I
1-May	S+	I and F	-	-
3-May	Z	F	Z *	F
5-May	Z	F	Z	F
9-May	Z	F	Z	F
11-May	Harvested		Z	F
15-May	-		Harvested	
<hr/>				
Total Treatment Applications	24		17	
	12 Insecticide Treatments		14 Insecticide Treatments	
	13 Fungicide Treatments		4 Fungicide Treatments *	

* Testing was taken on Monday May 1st.

On 5/2 Grower, had concerns State could pull the self-testing approval due to a couple weeks of high TYM scores. Grower asked if they could spray fungicides and PDW agreed to allow spraying.

Late on Thursday 5/4 results came back from both labs with passing TYM scores from the 5/1 testing (4 days of treatment with closer distance coverage and on 24/7 destroyed the TYM colonies).

By the time the grower was aware of the positive results showing the corrective action had worked it was too late as they had already sprayed twice.