LABORATORY TESTING: ROLLING PAPERS

Rolling Papers Tested for Heavy Metals and Pesticides

Highlights: This analysis report was prepared by Josh Wurzer, President and Co-Founder of SC Laboratories, Inc. The report addresses a number of laboratory tests conducted on rolling papers purchased online and from various retailers throughout Santa Cruz, California. The rolling papers were tested for heavy metals and pesticides.

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ABSTRACT

A cluster of over-limit detections of the pesticide chlorpyrifos in pre-roll samples submitted to SC Labs for regulatory compliance testing were traced to contamination in the rolling paper. In response, SC Labs tested several samples of rolling papers, cones, and wraps to gauge the levels of potential contaminants in these types of products. The laboratory purchased 118 products from Amazon and several smoke shops in the Santa Cruz area, 101 of which were tested for heavy metals and 112 of which were tested for pesticide contamination. At least one heavy metal was detected in 90% of the rolling paper products with 8% containing at least one heavy metal in concentrations above the allowable limits in California for inhalable cannabis products. Lead was the most commonly detected metal by a considerable margin. Pesticides were detected in 16% of the samples with 5% coming in over the allowable action limits. While 11% of the rolling papers in this study would fail above the action limits for inhalable products in California, it should be noted that the paper constitutes only a fraction of the overall mass of a cannabis pre roll product. Although the ratio of the mass of paper to cannabis flower varies within pre-roll products depending on a number of factors, it is safe to assume that rolling paper products that fail near the action limit would most likely not cause a compliance failure when combined with "clean" cannabis. Of the 18 over-limit failures, 10 could be considered near the action limit and 8 could be considered well over the action limit (defined as greater than two times the action limit).

INTRODUCTION

SC Labs was alerted to a potential contamination issue in some rolling paper products after a customer experienced unexpected pesticide detections in their pre-roll products submitted for compliance testing at our labs. The customer had previously tested the cannabis used to produce the pre-roll products without any pesticides detected. However, when prepared as a pre-rolled joint, the product failed. The papers became a suspected source of the contamination, and testing confirmed the presence of very high levels of chlorpyrifos, a common organophosphate pesticide. Shortly after, another customer had a similar issue in their pre-roll products, and the lab was able to trace the contamination back to the rolling papers as well.

These events triggered an investigation in which SC Labs acquired a broader sampling of rolling papers to assess the frequency of detection and measure the levels of contamination in these products. The goals of the experiment were to assess the exposure risks to the consumer as well as identify any potential liabilities for cannabis producers who use these products to make their pre-roll products.

The study focused on products purchased at local Santa Cruz smoke shops and via Amazon during the first week of July 2020. 118 products, including rolling papers, cones, and wraps were purchased in total. According to some of the labels, the products were made from either rice paper, hemp, or cellulose. However, many of the products were not labeled with the source fiber used.

For the purposes of the study, the samples were classified as either a standard rolling paper, a cone paper, a hemp or blunt wrap, or a cellulose-based paper. The samples were tested for the presence of 66 pesticides and 4 heavy metals as is required of all cannabis batches in California. The tests were performed to the specifications required by the California Bureau of Cannabis Control (BCC) and within the scope of the laboratory's accreditation, through PJLA2, to the ISO-17025:2017 standard.

Interestingly, while 90% of the samples tested positive for heavy metals and 16% tested positive for pesticides, only two of the papers had positive detections for chlorpyrifos, the contaminant that triggered the investigation. Furthermore, most of the detections were below California action limits. Of the 18 detections at concentrations over California action limits, 10 were still likely too low to cause a finished pre-roll to fail a compliance test. However, 8 of the 'fails' had at least twice the action limit, and several were many times the action limit. Standard rolling papers as a category seemed to have the lowest levels of contaminants, while the cellulose-based papers all had very high levels of heavy metal contamination. Two of the three cellulose papers had over 100 times the allowable levels of lead. The study did not include products that are not available to the general consumer. This could be an area of future investigation.

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MATERIALS AND METHODS

Table 1: A total of 118 products were purchased. Some of the products purchased didn't contain enough sample to perform both tests.

PRODUCT TYPE PURCHASED	QUANTITY TESTED
Rolling Papers	70
Pre-rolled Cones	25
Wraps	20
Cellulose-based Rolling Papers	3
	Total Tested: 118

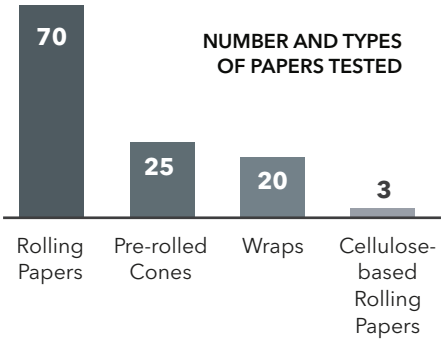

Table 2: Product Types Tested for Heavy Metals

HEAVY METALS TESTS CONDUCTED	QUANTITY TESTED
Rolling Papers	68
Pre-rolled Cones	12
Wraps	18
Cellulose-based Rolling Papers	3
	Total Tested: 110

Table 3: Product Types Tested for Pesticides

PESTICIDES TESTS CONDUCTED	QUANTITY TESTED
Rolling Papers	70
Pre-rolled Cones	20
Wraps	19
Cellulose-based Rolling Papers	3
	Total Tested: 112

Table 4: Analysis Equipment and Test Methods

TEST	TECHNIQUE	ANALYTES MEASURED
Heavy Metals	Inductively coupled plasma-mass spectrometry (ICP-MS)	4 Metals: Lead, Cadmium, Arsenic, Mercury
Pesticides	Liquid chromatography-mass spectrometry (LC-MS) and gas chromatography-mass spectrometry (GC-MS)	66 Pesticides + 5 Mycotoxins

TESTING ACCREDITATION

All tests were performed within the scope of the laboratory's accreditation, through PJLA[2], to the ISO-17025:2017 standard.

QUALITY STANDARD PROCEDURES

- 1152 - Sample Preparation
- 1160 - Analysis of Heavy Metals by ICP-MS
- 1212 - Analysis of Pesticides and Myctoxins by LC-MS

TESTING STANDARD

Tested following standards established by the Bureau of Cannabis Control (BCC). The BCC is the lead agency in regulating commercial cannabis testing for medical and adult-use cannabis in California.

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RESULTS

Overall, 11% or 13 of the 118 samples detected over the action limits (established by the BCC)[1] for either pesticide or heavy metal contamination. However, several of the samples were not tested for one or the other of the panels.

The cellulose-based rolling papers and wraps have significantly more detections over the action limit (100% and 40% respectively) than the pre-rolled cones or rolling papers (4% and 1% respectively). See tables 5 and 6 for result summaries.

Table 5: Result Summary

TYPES OF PRODUCTS PURCHASED	NUMBER OF PRODUCTS TESTED	NUMBER THAT EXCEEDED ACTION LIMITS[1]	PERCENT THAT EXCEEDED ACTION LIMITS[1]
Rolling Papers	70	1	1%
Pre-rolled Cones	25	1	4%
Wraps	20	8	40%
Cellulose-based Rolling Papers	3	3	100%
TOTALS	**118**	**13**	**11%**

Table 6: Sample Results Summary

SAMPLE NAME	SAMPLE TYPE	ANALYTE	REPORTED VALUE (µg/g)	ACTION LIMIT[1] (µg/g)
HEAVY METALS ANALYSIS				
TRIP2 Clear Cellulose King Size Rolling Papers	Cellulose-Based Paper	Lead	0.9	0.5
Smokeclear Cellulose Papers - King Size	Cellulose-Based Paper	Lead	55.1	0.5
aLeda Cellulose Rolling Papers - King Size	Cellulose-Based Paper	Lead	60.3	0.5
Benji $100 Papers	Rolling Paper	Lead	2.3	0.5
Twisted Hemp Wraps Tropical Breeze	Wrap	Arsenic	3.2	1.5
HydroLemonade High Hemp Wraps	Wrap	Lead	0.9	0.5
Pineapple Zig-Zag Cigar Cones	Wrap	Arsenic	1.6	1.5
Blueberry Zig-Zag Cigar Cones	Wrap	Cadmium	0.56	0.5
Blueberry Zig-Zag Cigar Cones	Wrap	Arsenic	5.4	1.5
PESTICIDES ANALYSIS				
Elements Ultra Thin Rice Cones - 1 1/4	Pre-Roll Cone	Chlorpyrifos	<LOQ	Detected
King Palm Margarita Squeeze & Pop	Wrap	Cypermethrin	2.2	1
King Palm Berry Terps	Wrap	Cypermethrin	7.1	1
King Palm Watermelon Wave Rolls	Wrap	Cypermethrin	4.6	1
HubbaBubba High Hemp Wraps	Wrap	Chlorpyrifos	0.08	Detected

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RESULTS (continued)

Heavy Metals Analysis

There were 9 detections over action limits across 8 samples out of 101 samples tested for heavy metals; however 91 out of 101 samples had detectable levels of at least one heavy metal.

Most samples had more than one metal detected with lead being the most common. One sample tested over the action limits for both cadmium and arsenic.

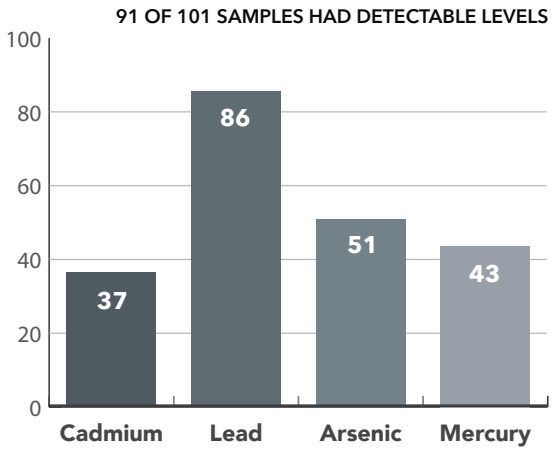

Figure 1: Total Number of Detections by Analyte

Table 7: Heavy Metals Detections Above Action Limits by Product Type

PRODUCT TYPE	NUMBER OF PRODUCTS TESTED	NUMBER THAT EXCEEDED ACTION LIMITS	PERCENT THAT EXCEEDED ACTION LIMITS
Rolling Papers	68	1	1%
Pre-rolled Cones	12	0	0%
Wraps	18	4	22%
Cellulose-based Rolling Papers	3	3	100%
TOTALS	**101**	**8**	**8%**

Table 8: Heavy Metals Total Detections by Product Type

PRODUCT TYPE	NUMBER OF PRODUCTS TESTED	NUMBER THAT EXCEEDED ACTION LIMITS	PERCENT THAT EXCEEDED ACTION LIMITS
Rolling Papers	68	58	85%
Pre-rolled Cones	12	12	100%
Wraps	18	18	100%
Cellulose-based Rolling Papers	3	3	100%
TOTALS	**101**	**91**	**90%**

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RESULTS (continued)

Pesticide Analysis

Pesticide contamination was less prevalent in general. Just 5 of the samples tested over California action limits for a pesticide, and 18 samples had detectable levels of pesticides. However, at least 4 of the 5 samples that tested over action limits had pesticide concentrations that were significantly over the action limit. Depending on the ratio of cannabis to rolling paper, some of these products could cause a pre-roll product to fail batch testing if used commercially in California.

Wrap products had the highest rates of detection as well as over-limit detection by a wide margin. 21% of wraps were over the action limits for pesticides, and 58% had detectable levels of pesticides. Just 1 (5%) of the cone samples tested over-limit, and 5 (25%) were found to have detectable levels of pesticides. None of the rolling paper samples or cellulose-based rolling papers tested over the limit, and only two out of 70 rolling paper samples tested had any detectable levels of pesticides.

Table 9: Pesticide Detections Above Action Limits by Product Type

PRODUCT TYPE	NUMBER OF PRODUCTS TESTED	NUMBER THAT EXCEEDED ACTION LIMITS	PERCENT THAT EXCEEDED ACTION LIMITS
Rolling Papers	70	0	0%
Pre-rolled Cones	20	1	5%
Wraps	19	4	21%
Cellulose-based Rolling Papers	3	0	0%
TOTALS	**112**	**5**	**4%**

Table 10: Pesticide Total Detections by Product Type

PRODUCT TYPE	NUMBER OF PRODUCTS TESTED	NUMBER THAT EXCEEDED ACTION LIMITS	PERCENT THAT EXCEEDED ACTION LIMITS
Rolling Papers	70	2	3%
Pre-rolled Cones	20	5	25%
Wraps	19	11	58%
Cellulose-based Rolling Papers	3	0	0%
TOTALS	**112**	**18**	**16%**

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DISCUSSION

The results of this survey confirm that most rolling paper products available on the consumer market contain pesticide or heavy metal contaminants controlled by California and several other states where cannabis is legal. A significant portion of them have levels of contamination in excess of the allowable limits in California and elsewhere.

It is not surprising to find a prevalence of heavy metals detected in the rolling paper products and should not be considered alarming on its own. The common materials used to manufacture these products are known to accumulate metals contaminants, and many natural fiber based materials have detectable levels of metals. However, what was demonstrated is that there is a wide range of the concentrations of metals contamination in these products from relatively low level to grossly contaminated.

With pesticides, the story is largely the same. Though less prevalent, the concentration of pesticide contaminants varied widely, and a significant percentage of the products tested were contaminated with pesticides in concentrations that exceeded the action limits.

This would suggest that consumers should at least be made aware that rolling papers aren't currently regulated in the same manner as the cannabis that they place in the papers and to act with caution. Additionally, producers of pre-roll products should be on notice that their paper inputs are a potential liability when it comes to batch testing. Rolling paper product manufacturers may want to reconsider their product quality specifications to be able to meet the regulatory compliance standards.

References

1. Action limits established by the California Bureau of Cannabis Control (BCC) were used as reference for the analysis of heavy metals and pesticides
2. Perry Johnson Laboratory Accreditation (PJLA)
3. Limit of quantification (LOQ)

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