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Standard Guide for Assessing Spoilage of Hemp Seed Intended for Human Consumption¹

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INTRODUCTION

Hemp seed contains significant amounts of oil and omega fatty acids, and as a result is susceptible to spoilage and rancidity. High-rancidity levels create an unpalatable taste and odor and can result in unsaleable product. Once initiated, these conditions can quickly spread throughout a seed lot/batch and may render a load or stored lot unfit for human consumption. Other methods of testing include analysis of peroxide value and free fatty acid content, but the time needed for these results can hinder product movement and lead to more spoilage. A timely and visual method to assess spoilage is described to assist decision-making, product use, business transactions, and improved process flow.

1. Scope

1.1 This guide covers the recommended steps for a visual assessment of spoilage in hemp seed intended for human consumption. Additional recognized laboratory tests can be completed as necessary to augment this guide.

1.2 This guide applies to plant breeders, hemp seed producers, storage facilities, laboratories, and processors. This guide does not apply to hemp seed intended for planting.

1.3 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *dehulled hemp seed, n*—internal seed material of the hemp seed.

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2.1.1.1 *Discussion*—The terms heart, nut, and hulled hemp seed are synonymous with dehulled hemp seed.

2.1.2 *free fatty acids, FFA, n*—amount of fatty acid in the sample that reacts with a chromogenous compound and decreases its color.

2.1.2.1 *Discussion*—The decreasing color is proportional to the acid concentration of the sample expressed as percent of oleic acid.

2.1.3 *hemp seed, n*—intact achene (fruit) produced from a hemp plant that is capable of normal germination.

2.1.3.1 *Discussion*—Primarily used for sowing to grow a plant or for further processing, this is sometimes known as hemp grain.

2.1.4 *hemp, n*—a *Cannabis sativa* L. plant, or any part of that plant, in which the concentration of total delta-9 tetrahydrocannabinol (THC) in the flowering tops is equal to or less than the regulated maximum level as established by authorities having jurisdiction.

2.1.4.1 *Discussion*—The term hemp is synonymous with industrial hemp.

2.1.5 *organoleptic test, n*—a subjective assessment of flavor, odor, appearance, and texture of a food product using a trained panel of experienced persons.

2.1.5.1 *Discussion*—The exact method can vary depending on the product.

2.1.6 *peroxide value, PV, n*—a test capable of determining the milliequivalents of peroxide oxygen combined in a kilogram of oil, measuring the amount of peroxide oxygen in 1 kg of fat or oil.

2.1.7 *visual spoilage test, n*—the process of spreading whole hemp seed on a precise 100-count test surface, crushing the

seed, and exposing the internal condition and coloration to count discolored dehulled seed.

2.1.7.1 *Discussion*—A comparison of discolored dehulled hemp seed is completed using a standardized color code chart (see [Appendix X1](#)).

3. Significance and Use

3.1 This guide provides a method for rapid, visual, on-site assessment of spoilage of hemp seed that will assist in managing food quality and productivity while maintaining consumer safety. It can be augmented with a number of laboratory tests to determine spoilage.

3.2 This guide provides a method to identify hemp seed samples that are likely to spoil by quantifying discolored (dark yellow or brown) dehulled seed. Samples from lots/batches that display more than 2 % discolored² dehulled seed are generally considered to be compromised.

3.3 Laboratories providing certificates of analysis can validate this spoilage test. Used in conjunction with a peroxide value (PV) and FFA content or other methods, results will help determine the acceptability of a lot/batch of seed. In addition, a trained panel can complete organoleptic testing, but this should be used in combination with other tests.

3.3.1 It is recommended that where possible, test results taken from samples are reported with a calculated margin of error to ensure statistical significance or relevant results.

3.4 Product wastage will be reduced when spoilage is identified early, and decisions to re-target other viable uses may help assess pricing, discounts, and salvageable seed.

4. Materials

4.1 *Hemp Seed Retainment Block*—Solid material (for example, plastic, wood, or metal) measuring a minimum of 48 mm wide, 192 mm long, and 6.35 mm deep with 100 evenly spaced holes/cavities each measuring 4.76 mm diameter and 3.18 mm deep.

4.2 *Clear packing tape* or similar retention membrane at least 48 mm wide and a solid material hand roller at least 48 mm in width.

4.3 A piece of *white paper* (sufficient in size to form a backing for the tape/seed assembly).

4.4 *Standardized spoilage indicator color scale* as referenced in [Appendix X1](#). Colors are based on shades of yellow, orange, and brown commonly seen in hemp seed discoloration and represented using two international color models—red, blue, and green (RGB); and hue, saturation, and lightness (HSL).

² Adapted from similar test used in Canadian canola seed by Canadian hemp food processors. Consumer tolerance rates indicate unwillingness to purchase if over 2 % discolored seeds (see Canadian Hemp Trade Alliance, Standards Committee 2019).

5. Sampling

5.1 A prerequisite for consistent results includes the collection of representative samples of hemp seed and use of noncontaminated equipment and tools.

5.2 Storage and transportation conditions of samples should be as close as possible to the same temperature and humidity levels of the crop represented. Use of airtight containers not easily adulterated by rodents, insects, chemicals, fecal material from birds, and other physical contaminants is recommended.

6. Procedure

6.1 Collect a representative sample of hemp seed to be tested.

6.2 Pour the sample onto the retainment block, allowing each of the available holes/cavities to be filled, tipping off extraneous seed.

6.3 Place a piece of clear packing tape, adhesive side down over the seed in the test strip surface, apply consistent hand pressure, and sweep across the tape allowing the seed to adhere to the tape.

6.4 Gently turn the retainment block with the tape affixed over 180° so that the retainment block is upside down. Gently separate the retainment block from the tape.

6.5 Place a second piece of tape over the exposed seed and press down firmly across the entire surface of the tape.

6.6 With the hand roller, press firmly against the seed, effectively crushing all seed and exposing the dehulled hemp seed coloration within.

6.7 Place the tape down onto a white piece of paper to identify the discolored dehulled seed. Compare the color with the standardized color code chart (referenced in [Appendix X1](#)) and circle the discolored dehulled seed with an indelible marker.

6.8 Count the discolored dehulled hemp seed and then determine the percentage of discolored seed by dividing the number of discolored seeds by 100. A higher percentage of damaged/discolored seed indicates a lower quality lot/batch.

6.9 Write lot number and date sampled on the tape to identify the test sample. Record the resulting value in a data log with the date sampled and lot number.

6.10 Repeat this process a minimum of two times and calculate the average percentage. Report the average value for the batch/lot of sorted hemp seed being tested.

7. Keywords

7.1 cannabis; dehulled hemp seed; hemp seed; industrial hemp; rancidity; sampling; spoilage