



**Beta Analytic**  
TESTING LABORATORY

**Beta Analytic, Inc.**  
4985 SW 74<sup>th</sup> Court  
Miami, FL 33155 USA  
Tel: 305-667-5167  
Fax: 305-663-0964  
[info@betalabservices.com](mailto:info@betalabservices.com)

ISO/IEC 17025:2017-Accredited Testing Laboratory

**Summary of Results** - % Biobased Carbon Content  
ASTM D6866-21 Method B (AMS)

**Certificate Number:**

**Validation:**

---

<b>Submitter</b>	Tyler Trimbath
<b>Company</b>	Bio Rejuv, LLC.
<b>Date Reported</b>	April 23, 2021
<b>Submitter Label</b>	Roof Rejuv / USDA Application

**RESULT:** 90 % Biobased Carbon Content (as a fraction of total organic carbon)

<b>Laboratory Number</b>	
<b>Percent modern carbon (pMC)</b>	90.26 +/- 0.28 pMC
<b>Atmospheric adjustment factor (REF)</b>	100.0; = pMC/1.000

Disclosures: All work was done at Beta Analytic in its own chemistry lab and AMSs. No subcontractors were used. Beta's chemistry laboratory and AMS do not react or measure artificial C 14 used in biomedical and environmental AMS studies. Beta is a C14 tracer-free facility. Validating quality assurance is verified with a Quality Assurance report posted separately to the web library containing the PDF downloadable copy of this report.

---

Precision on the RESULT is cited as +/- 3% (absolute). The cited precision on the analytical measure (pMC) is 1 sigma (1 relative standard deviation). The reported result only applies to the analyzed material. The accuracy of the RESULT relies on the measured carbon in the analyzed material having been in recent equilibrium with CO<sub>2</sub> in the air and/or from fossil carbon (from living more than 40,000 years ago such as petroleum or coal). The RESULT only applies to relative carbon content, not to relative mass content. The RESULT is calculated by adjusting pMC by the applicable "Atmospheric adjustment factor (REF)" cited in this report.



ISO/IEC 17025:2017-Accredited Testing Laboratory

**Summary of Results** - % Biobased Carbon Content  
ASTM D6866-21 Method B (AMS)

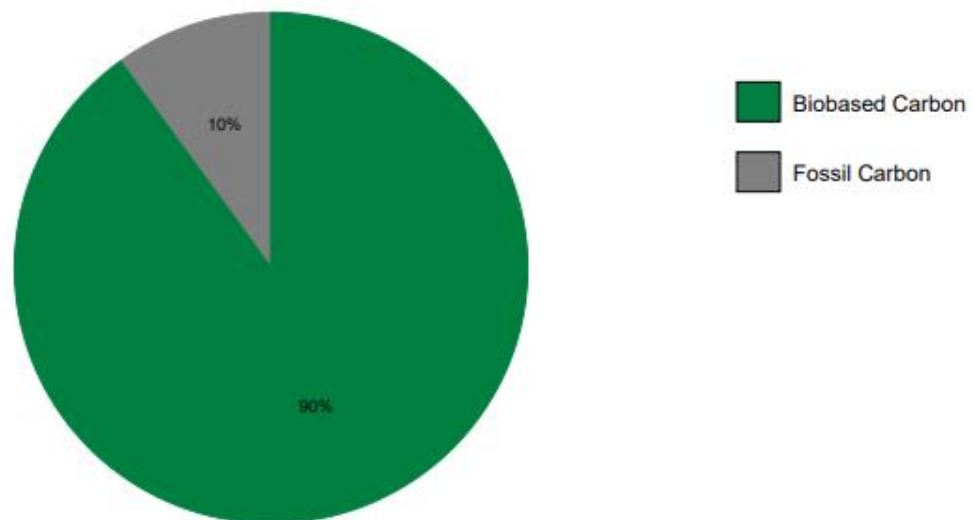
**Certificate Number:**

**Validation:**

<b>Submitter</b>	Tyler Trimbath
<b>Company</b>	Bio Rejuv, LLC.
<b>Date Reported</b>	April 23, 2021
<b>Submitter Label</b>	Roof Rejuv / USDA Application

**RESULT:** 90 % Biobased Carbon Content (as a fraction of total organic carbon)

<b>Laboratory Number</b>	
<b>Percent modern carbon (pMC)</b>	90.26 +/- 0.28 pMC
<b>Atmospheric adjustment factor (REF)</b>	100.0; = pMC/1.000





**Beta Analytic**  
TESTING LABORATORY

**Beta Analytic, Inc.**  
4985 SW 74<sup>th</sup> Court  
Miami, FL 33155 USA  
Tel: 305-667-5167  
Fax: 305-663-0964  
[info@betalabservices.com](mailto:info@betalabservices.com)

---

ISO/IEC 17025:2017-Accredited Testing Laboratory

---

## **% Biobased Carbon Content ASTM D6866-21 Method B (AMS)**

### **Explanation of Results**

The result was obtained using the radiocarbon isotope (also known as Carbon-14, C14 or 14C), a naturally occurring isotope of carbon that is radioactive and decays in such a way that there is none left after about 45,000 years following the death of a plant or animal. Its most common use is radiocarbon dating by archaeologists. An industrial application was also developed to determine if consumer products and CO<sub>2</sub> emissions were sourced from plants/biomass or from materials such as petroleum or coal (fossil-based). By 2003 there was growing demand for a standardized methodology for applying Carbon-14 testing within the regulatory environment. The first of these standards was ASTM D6866-04, which was written with the assistance of Beta Analytic. Since ASTM was largely viewed as a US standard, European stakeholders soon began demanding an equivalent CEN standard while global stakeholders called for ISO standardization.

The analytical procedures for measuring radiocarbon content using the different standards are identical. The only difference is the reporting format. Results are usually reported using the standardized terminology "% biobased carbon". Only ASTM D6866 uses the term "% biogenic carbon" when the result represents all carbon present (Total Carbon) rather than just the organic carbon (Total Organic Carbon). The terms "% biobased carbon" and "% biogenic carbon" are now the standard units in regulatory and industrial applications, replacing obscure units of measure historically reported by radiocarbon dating laboratories e.g. disintegrations per minute per gram (dpm/g) or radiocarbon age.

The result was obtained by measuring the ratio of radiocarbon in the material relative to a National Institute of Standards and Technology (NIST) modern reference standard (SRM 4990C). This ratio was calculated as a percentage and is reported as percent modern carbon (pMC). The value obtained relative to the NIST standard is normalized to the year 1950 AD so an adjustment was required to calculate a carbon source value relative to today. This factor is listed on the report sheet as the terminology "REF".

Interpretation and application of the results is straightforward. A value of 100% biobased or biogenic carbon would indicate that 100% of the carbon came from plants or animal by-products (biomass) living in the natural environment and a value of 0% would mean that all of the carbon was derived from petrochemicals, coal and other fossil sources. A value between 0-100% would indicate a mixture. The higher the value, the greater the proportion of naturally sourced components in the material.

## Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NISTSRM-1990C and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

### QA MEASUREMENTS

#### Reference 1

Expected Value: 96.69 +/- 0.50 pMC

Measured Value: 96.36 +/- 0.30 pMC

Agreement: Accepted

#### Reference 2

Expected Value: 129.41 +/- 0.06 pMC

Measured Value: 129.45 +/- 0.39 pMC

Agreement: Accepted

#### Reference 3

Expected Value: 0.44 +/- 0.10 pMC

Measured Value: 0.46 +/- 0.03 pMC

Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation:

  
Digital signature on file