Saturation Media Extract (SME) Application Package for Cannabis

Procedures for Media Extractions and Analysis for PO_4-P, NO_3-N, K, Ca, Mg, pH and Conductivity

Nutrient Summary for Cannabis:

Nitrogen, phosphorus and potassium are the three main nutrients your cannabis needs and are expressed in the N-P-K fertilizer ratio. Cannabis requires a higher nitrogen ratio during the vegging and early flowering stage as nitrogen is the main component for growth. During the flowering stage a lower nitrogen and higher phosphorus ratio is optimal. Optimal nutrient ratios vary depending on the variety of the strain of cannabis.

Introduction to the Saturated Media Extraction:

This analysis package describes methods for determining PO_4-P, NO_3-N, K, Ca, Mg, pH and Conductivity in greenhouse media samples using the saturated media extraction (SME) method.

Greenhouse growers have moved away from using straight field soils to utilizing either mixes of soil and processed materials or processed materials alone for plant growing beds. These media mixes have both chemical and physical properties which are completely different from the straight field soil and consequently need to be treated differently for nutrient analysis.

The SME procedure has been routinely used for the analysis of this type of growing media. The growing media is briefly saturated with DI water while being stirred for 2 hours to allow the sample to equilibrate. After the sample equilibration, the solution is extracted using vacuum filtration and this extract is then used for the analysis.

Measurement of the salt and nutrient concentrations in the saturated extract produces results that consider the water holding characteristics of the growing media which can be directly related to plant response. The SME method uses a large sample size to reduce sampling errors.

Extraction Procedure:

The saturated media extraction method is suitable to formulated greenhouse growing mixes that contain little if any field soil. The extract is used PO_4-P, NO_3-N, K, Ca, Mg, pH, Conductivity (soluble salts) determinations.

Reagents:

- 27200 = DI water, 3.78 L (or equivalent)

Apparatus:

- 50025 = Beaker, Glass, 600 mL
- 251764 = Parafilm-M
- 56162 = Spatula, 3" Blade
- 1428300 = Vacuum Hand Pump

Analyzing for ~500 mLs of sample:

- 50657 = Filter Paper, 125-mm, 100/pk
- 54649 = Filtering Flask, 500-mL
- 55095 = Buchner Funnel, 126-mm, ~700-mL volume
- 211907 = Rubber Stopper, Size 7, one hole, 6/pk

Analyzing for ~100 mLs of sample:

- 50652 = Filter Paper, 55-mm, 100/pk
- 54643 = Filtering Flask, 125-mL
- 55085 = Buchner Funnel, 56-mm, ~87-mL volume
- 211904 = Rubber Stopper, Size 4, one hold, 6/pk

Preparation:

Assemble the filtration apparatus by slowly working the stem of the Buchner funnel through the rubber stopper. The hole in the stopper may need to be bored out further with a set of cork borers. Seat the assembled funnel and stopper combination into the mouth of the filtering flask. Connect the hand operated vacuum pump to the filtering flack side arm with the pump tubing.

Procedure:

1. Fill the 600-mL beaker to the 400-mL mark with the greenhouse media to be tested.
2. Add DI water while mixing the sample until it is completely wetted/saturated.
3. Cover the beaker with Parafilm-M and let it stand for 2 hours.
4. Pour the sample onto the filtration until and filter it, collecting the filtrate for the analyses that follow.

Analytical Procedures:

Phosphate-Phosphorus Method 10209:
TNT843 (0.05-1.5 mg/L PO_4-P), TNT844 (0.5-5.0 mg/L PO_4-P) or TNT845 (2-20 mg/L PO_4-P)

- Dilute the sample down to one of the concentration ranges listed for PO_4-P reagent sets. For example, take 1 mL of sample and dilute it up to 25 mLs with DI water in a 25-mL graduated cylinder. Multiply the final concentration reading by 25 for the non-diluted concentration value. Ensure that the DR spectrophotometer is reporting as PO_4-P.

Nitrate-Nitrogen Method 10206:
TNT835 (0.2-13.5 mg/L NO_3-N) or TNT836 (5-35 mg/L NO_3-N)

- Dilute the sample down to one of the concentration ranges listed for NO3-N reagent sets. For example, take 1 mL of sample and dilute it up to 25 mLs with DI water in a 25-mL graduated cylinder. Multiply the final concentration reading by 25 for the non-diluted concentration value. Ensure that the DR spectrophotometer is reporting as NO_3-N.

Potassium Method 8049:

- Reagent set: 2459100 (0.1-7.0 mg/L K)
- Dilute the sample down to below 7 mg/L K concentration range. For example, take 1 mL of sample and dilute it up to 25 mLs with DI water in a 25-mL graduated cylinder. Multiply the final concentration reading by 25 for the non-diluted concentration value.

Calcium and Magnesium (Mg by difference):
Total hardness Method 8213

- Reagent set: 2448100 (100-4000 mg/L $CaCO_3$)
- Dilute the sample following the Digital Titrator method and select the appropriate sample volume for the perceived concentration range.

Calcium hardness Method 8204

- Reagent set: 2447500 (100-4000 mg/L $CaCO_3$)
- Dilute the sample following the Digital Titrator method and select the appropriate sample volume for the perceived concentration range.

pH Method 8156:
(0 - 14 pH Units)

- Direct measurement

Conductivity Method 8160:
(0.01 µS/cm - 200 mS/cm)

- Direct measurement

Procedures:

Phosphate-Phosphorus

- TNT843 Procedure
- TNT844 Procedure
- TNT845 Procedure

Nitrate-Nitrogen

- TNT835 Procedure
- TNT836 Procedure

Potassium

- Potassium Procedure

Total Hardness

- Total Hardness Procedure

Calcium Hardness

- Calcium Hardness Procedure

pH

- pH Procedure

Conductivity

- Conductivity Procedure

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