TECHNICAL PAPER

NUTRIENT RUNOFF & EC MONITORING

The electrical conductivity (EC) of soil is an indicator of soluble salts that may be present in the root zone. Soil salinity is an important factor of soil health. Excess salinity can affect crop yields, nutrient availability and soil fertility. Although EC does not provide a concentration of specific elements, it has been correlated to concentrations of nitrates, potassium, sodium, chloride, sulfate, and ammonia.

Factors that affect soil EC include irrigation, fertilization and growing environment. Low volume irrigation and overfertilization can lead to salt accumulation in the root zone, increasing EC. High temperatures and low humidity in the growing environment can increase transpiration, leading to an increase in salt accumulation.

MEASURING EC

EC can be measured by different methods and instrument types. There are two main instrument types in measuring EC – direct testers and EC meters. Direct testers can be inserted into the growing media to measure EC. These types of testers provide quick readings, without the need for additional steps. Accurate measurements with direct testers are dependent on media moisture, temperature and good contact with the growing media. Readings from direct meters will vary significantly between dry and moist media. Direct testers are effective for measuring the bulk EC of the media. Using a direct tester for other types of EC tests will result in inaccurate data.

EC meters measure EC of a solution. While they involve additional preparation steps prior to measurement, they will provide more consistent readings without the sensitivities of direct testers. EC meters can be used for measuring EC of media in a slurry test or EC of runoff after a nutrient feeding. To ensure accurate measurements with either type of instrument, calibrate the equipment regularly using manufacturer recommendations.

TYPES OF EC TESTS

There are four main types of EC tests pertinent to Cannabis growers (Figure 1). Each test will provide a different piece of information to guide nutrient management decisions.

DETERMINATION OF EC OF FRESH MEDIA

To measure the EC of unused media, such as coco coir, the slurry test method with an EC meter is the most reliable method. To start, weigh out a sample of coco and mix with water in a 1:1 or 1:2 ratio. For example, if you weigh 10 g of coco, you can add 10 mL (1:1) or 20 mL (1:2) water. Stir and allow it to rest for 15 minutes. An EC meter can then be used to measure EC.

RUNOFF EC

To check the EC of runoff after a nutrient feed, collect the runoff in a container placed under a pot. Use an EC meter to measure the collected runoff to determine appropriate feeding of plants.

EC OF SOLUTION IN MEDIA

After a plant has been fed, solution is retained that interacts with the media. The retained solution is what will continue to feed the plant between irrigation events. Using the pour-thru method will help to quantify the EC of this solution. To start, wait for 30-45 minutes until after plants have been fed. Place a saucer under the pot and add 100 mL of reverse osmosis (RO) water to the pot. Wait for runoff to be collected. If no runoff appears, add another 50 mL of RO water. For the best measurements, collect ~100 mL of runoff from the pot. An EC meter can then be used.

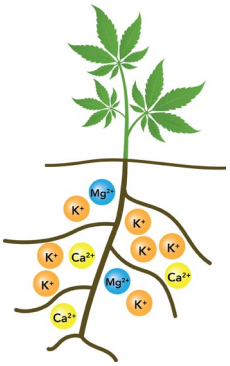
BULK EC

In any pot or grow bag, there is air, water, and media. The combined EC of these three components is called bulk EC. Direct testers can be inserted into the media to measure bulk EC for a quick reading. Each manufacturer provides specific recommendations for use, but there are two general principles to remember. First, ensure good media to probe contact by inserting the tester deep enough in the pot. Second, take readings approximately one hour after a feeding to ensure appropriate moisture.

Test to determine EC of fresh media
Slurry method 1:1 or 1:2

Test to determine EC of runoff
Test EC of collected runoff after feeding

Test to determine EC of solution in grow media
Use pour-thru method to collect solution for EC test



Test to determine bulk EC (air, media, water)
Insert direct EC tester in media

Figure 1. Selecting an EC test method.

CONCLUSION

Every cultivation facility should have a staff member dedicated to measuring EC in the substrate. The importance of this cannot be understated. Understanding why plants take a turn for the worse starts with understanding the environment in the root zone.