SUN GRO HORTICULTURE

TECHNICAL BULLETIN

Bag Volumes – Practicalities and Regulations

Packaging contents in the professional peat moss and growing media market is standardized based on volume. Each product has a stated claim of the volume that is in the package. Package volume is declared in cubic feet (cu. ft. or CF) and also in liters (l or L). Bulk deliveries are usually sold in cubic yards (cu. yd. or CY). The current volume and sizes for professional growing media products in the marketplace consists of the following:

Loosefill products	**Compressed products**
• 2.8* or 3.0 cubic feet (CF) • 60* or 70* cubic feet (CF)	• 3.8* cubic feet (CF) • 5.5* cubic feet (CF) • 55* cubic feet (CF) • 110 cubic feet (CF)

* Indicates SunGro typical size

A Little History

Volume fills have changed over the years. Sizes for compressed peat moss and growing media products used to be 6.0 CF and 4.0 CF. This has been changed to an "across the board" 3.8 CF for better handling (weight) and pallet configuration, although a certain amount of 6.0 CF bales are still sold with peat moss. Loosefill growing media products used to be 4.0 CF until bark mixes arrived on the scene. Then bag volumes were decreased to 3.0 CF for weight / handling reasons. The industry has changed for customer driven reasons -- To afford easier handling and to remove confusion via standardization.

How are volumes measured?

This is a significant question because increasing size, and compaction, of the product can have a significant effect on the package volume but not affect the minimum number of pots or flats that are filled. The approved testing method depends on where you sell the product and the product size. Each method will give you a slightly different value.

For **compressed products**, two methods are the accepted methods. In Canada, the FIBSPAN[1] method is standard. In the US the ASTM[2], one cubic foot box method is standard. For **loosefill products**, in Canada the FIBSPAN method is utilized. In the US, the standard method for 3.0 CF and lower volume packages is the 3 CF box adopted by the NIST (National Institute of Standards and Testing). For packages larger than 3 cubic foot, the one cubic foot box method is used.

When using a one CF box (internal dimensions of 12"W x 12"H x 12"D), the procedure is to fill the box by gently removing product from the package into the 1 CF box and using a

[1] **FIBSPAN = Fisons International British Standard Procedure Afnor Normes**
[2] **ASTM = American Society for Testing and Materials, procedure D2978-71**

straightedge to screed off the excess from the top. The procedure is continued until the entire package volume is measured for smaller packages. In the case of large packages, such as mini-totes, five (5) samples are taken, the bulk density measured per cubic foot, and the full volume is mathematically calculated. Tapping, spinning or shaking the 1 CF box is not to be practiced.

On the other hand, when measuring 3.0 CF or a smaller package, the use of the 3 CF box method is specified. A box that is 9"W x 15"D x 36 to 40"H is used. Each bag is rolled 5 times to fluff the product and then the content of the bag is gently transferred to the box. The product is leveled and the height noted. Volume is then mathematically calculated. This is also the standard US procedure to assure the volume of 2.8 CF products. Because the compression affects the height when using the 3 CF box method, the volumes will always measure approximately 0.2 CF LESS than the 1 CF box method. In other words, the same amount of product measured as 3.0 CF using the 1CF box method will measure 2.8 CF using the 3 CF box method. That is why there has been the move to the 2.8 CF packaging -- Customers are still getting 3.0 cubic feet of product, however the measuring procedure will only report 2.8 CF.

The FIBSPAN method is different. This method involves measuring the bulk density of a one-liter sample of product. The total volume of the package is then calculated using the bulk density of the material and the weight of the package.

The FIBSPAN assembly includes a one-liter cylinder, a small collar, and a funnel that fits over the cylinder / collar and a weighted plunger. The procedure is to fill the cylinder /collar though the funnel. The funnel is taken off, the top of the collar is struck level and a weighted "plunger" is placed on top of the collar for a period of three minutes. The plunger is taken off, the collar is taken off and then the top of the mix is struck level on the one-liter cylinder. The cylinder is then weighed and then net weight of the one-liter of material is computed. The weight of the package is then divided by the bulk density of this one-liter to arrive at the volume. Manufacturers will often use this in place of the other two techniques but the key is that *regulatory compliance* is based on the accepted measuring technique for the territory the product is sold. The FIBSPAN method can be used as long as a correction factor is used to relate the FIBSPAN to other methods of measurement.

What does this mean to you?

For growers who remember the days when 3.0 CF was the stated package volume, rest assured, Sun Gro did not change the amount of product put into the packages but simply changed the label claim from 3.0 CF to 2.8 CF. As mentioned above, this was to comply with the new regulations but it did not change the amount of product you receive.

How are volumes assured at the plant?

Volumes are assured at the plant in two ways. First, the line operators measure and calibrate "bag fill" *at the start* of each production run using the accepted standard method. The bag fill target is the stated volume plus an additional "over fill". Second, throughout the production shift, line operators continue to verify proper bag fill volumes.

There can be some variability from bag to bag on the exact volume. Overfills are used to assure the volume *in* the bag meets the volume stated *on* the bag as a result of normal settling or slight compaction from packaging and palletization.

Factors affecting the number of pots filled from a bag of mix

Customers often relate to the volume as the number of containers filled and not the volume that is actually in the bag. Various factors can affect the number of containers that are actually filled making this an inexact measure. Factors include but not limited to:

- **Exact container size**. Not all containers with the same stated size hold the same volume. This is extremely important. Growers often switch pot vendors without realizing the impact it will have on their soil needs.
- **Fill compaction**. Whether filling by hand or filling by machine, various levels of compaction in the container impact the number of containers filled.
- **Moisture of growing media during filling**. Slight hydration of peat fibers causes them to expand somewhat thereby causing the mix to fill more containers.
- **Product age**. The age of the product has an effect since storage conditions and time have an effect primarily on moisture.

Growing media manufacturers often provide information assisting customers to determine how many containers will be filled by a bag of product or a cubic foot of mix. This information should be considered only as a general guide and not a precise measurement.

Compressed Mix is an exception to the ' volume on the bag' rule

Stated volumes for compressed product are in the compressed form, example: A 3.8 CF compressed bale means the final compressed product volume is 3.8 CF, not the fluffed volume. However, customers do not use the product compressed – The product is decompressed, expanded or "fluffed". Most companies, including Sun Gro, communicate the expected approximate volume after fluffing. Because there is more variability with compressed products based on how the product is fluffed, Sun Gro assures that there is approximately 7.2 cu ft per 3.8 cu ft bale *on average* for compressed based on FIBSPAN tests. Fluffed volume are 100CF for growing media in 55 cu ft BIG SHOTS and 110 for peat. An average of 5 to 10 bales is often adequate. Moisture and the method of "fluffing" are both critical factors in achieving targeted expansion rates.

Bulk Deliveries

Some customers desire product to be delivered in bulk. Volume fill are assured by measuring the weight of the mix dispensed into the truck and calculating the volume using the average bulk density using the FIBSPAN or one cubic foot box method. Depending on the distance from the plant, various levels of settling and compaction occur during transit. As for compressed bales, the mix needs to be fluffed before use.

Summary

Volume is the measure that most companies use to assure that the correct amount of product is delivered to the customer. Regulatory guidelines dictate how a product will be

measured which in turn affects the way it is labeled. These methods are what governs the amount of mix in a package.

Measuring volume by the number of containers filled, while seemingly practical, allows more variability and leads to inaccurate data. Compression and compaction add another level of variability to measuring volumes. Using the proper equipment and method of measurement is the only way to assess proper container fill volumes.

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