

## WSA: Water Stable Aggregate Stability

### What is Aggregate Stability (WSA %)?

Aggregate Stability (WSA%) is a measure of the extent to which soil aggregates resist falling apart when wetted by and hit by rain drops. It is also an indicator of a soils resistance to compaction. The physical property of WSA is a fundamental soil parameter;

- ✓ It is a measure of a soils capacity to retain its structure under conditions likely to cause compaction.
- ✓ Soils with low WSA tend to form surface crusts which can reduce both water infiltration and air exchange.
- ✓ Poor WSA also makes soil more difficult to manage and can reduce its ability to dry off quickly.
- ✓ Soils with low WSA% tend to have low organic matter content, and suppressed biological activity.
- ✓ In heavy soils, enhanced friability and crumbliness from good aggregation (high WSA%) make soils seem lighter.

### How is it measured?

This system used by AgVita Analytical was developed by the Cornell University team at the NYSAES.

AgVita measures WSA% using a raindrop simulation sprinkler

(see photos) that steadily delivers uniform sized water droplets from a known height over a measured time period onto a sieve containing a known weight of 0.5mm to 2.00mm screened dried soil.

Soil aggregates which are unstable will fall apart under this rainfall simulation and are passed through the sieve to be collected on filter papers which are dried overnight and reweighed. The effect of remnant inert mineral grains (pebbles) in the retained soil is also taken into account.

The reported WSA % is calculated using the dried weight of the stable and slaked fractions, and expressed as a percentage of the total sample weight.



## How can I manage my soil health?

Long term tillage of soils can reduce soil tilth quality and break down soil aggregates and organic matter (OM), affecting yields. Such soils can become so degraded (compacted) that they become reliant on tillage, and crop establishment requires a soil loosening operation. A successful transition to reduced tillage and planting operations often requires significant addition of green manure or alternative organic matter (e.g. biosolids) and/or focused tillage.

Monitoring the WSA of soils will aid soil management decisions, with increased green manure cropping or organic matter applications to stabilize soil aggregates as required.

## WSA Q&A:

### Q. Why should I monitor my soil using WSA?

It can take many months to a few years to modify/rectify soil health for parameters like aggregate stability in most soils. The progress of this process may not be evident until a trailing crop is planted. However, by regular WSA analysis, incremental improvements in soil health can be monitored.

### Q. What depth should I take my samples from for a WSA analysis?

WSA decreases with depth from surface, so sampling from surface to within the root zone of most crops is recommended (e.g. 0-15 cm, 0-20 cm)

### Q. Can I use the same sample I've submitted for an **expressSoil**<sup>®</sup> analysis for WSA?

Yes you can, provided sufficient sample has been submitted – WSA analysis uses the same dried soil that has been prepared for **expressSoil**<sup>®</sup>.

### Q. What is the relationship between WSA% and crop yield?

Trials of this product by Tasmanian growers have revealed excellent correlations between soil WSA and marketable grade & crop yields for root vegetables.

### Q. Is WSA applicable to all soil types?

Yes – heavy soils will have higher WSA than sandy soils, for example. Nonetheless, within a particular soils type, variations will be noticeable and give important soil management information.

### Q. How do I improve a soil with low WSA?

The simplest solution is to grow a green manure cover crop, or to apply organic materials to the paddock (e.g. composts, manures, biosolids). Cropping will, in general terms, decrease WSA, as does tillage. WSA is positively correlated to clay content and organic content of soil - in other words, proactive management of soils with cover crops, for example, will have the added benefit of improving soil organic carbon levels, as well as microbial activity.

### Q. Can WSA % indicate other soil health issues?

There is preliminary evidence to suggest an inverse relationship between WSA and soil sodicity. There is also evidence of a correlation to organic carbon and microbial activity.

### Q. When is the ideal time to sample for WSA testing?

WSA % of a paddock will vary before and after cropping, especially for root vegetables. Periodic tillage reduces WSA%. It is suggested therefore to sample at the same time each year/season, either pre-plant or post harvest, in conjunction with chemical and/or biological soil analysis (**expressSoil**<sup>®</sup>, **SMI**<sup>™</sup>)