

## Aloe Vera – The Whole Leaf Advantage

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In the evolution of processing methods of Aloe vera leaves, the hand-filleting procedure was developed to avoid contamination of the internal gel fillet with the yellow sap found in the pericyclic cells of the vascular bundles located just beneath the thick green rind of the leaf. The yellow sap has a number of laxative anthraquinones, the major being aloin. As the laxative action of these anthraquinones may be associated with considerable abdominal cramping in humans, these agents, although widely used from the 17th through the 20th centuries, have been replaced by laxative agents possessing fewer undesirable side-effects.

Aloin contains a glucose molecule attached to the parent anthracene ring. If the glucose is cleaved off, the resulting product is Aloe-emodin, which has, depending on its concentration, a red through brown through black coloration, which is in cosmetic products. Thus, the presence of aloin or its derivatives is undesirable both for internal consumption and topical usage.

Recently processing methods using the entire whole leaf have been perfected so the undesirable elements can be selectively removed, while maximizing the desired constituents. Among the desirable constituents are the polysaccharides (glucomannans), glycoproteins and associated growth factors.

In Table 1, the data reveals that the quantity of desirable polysaccharides is 2 1/2 to 3 times the yield using the hand filleting methods.

**Table 1: Yields and Aloe Leaf Processing (without preservatives or additives)**

Process Fraction	Hand Filleting (%)	Whole Leaf (%)
Total Solids	0.45 – 0.65	1.30 – 3.50
Polysaccharides	0.12	0.16

Occasionally an individual sample may contain more than the amounts indicated in the table; this may occur if the leaves are dehydrated. These ranges will encompass 95% of routine samples based on current in-hand data.

The major undesirable constituents, the polyhydroxyanthraquinones, can be selectively removed through filtration through charcoal and other absorbents so the remaining level of aloin is 1 ppm or less.

In table 2, the data compares various processing methods and the effect on yield (total solids), aloin concentration, and the distribution of sizes of constituents. The whole leaf method can produce an Aloe juice which is high in total solids, high in retained high dalton (molecular weight) polysaccharides with their scientifically demonstrated benefits, while the aloin concentration is at a very acceptable low level.

**Table 2: Methods of Leaf Preparation and Constituents**

Method of Preparation	pH	Aloin (ppm)	(%) H2O	(%) Total Solids
Hand Filleting	4.27	6	99.25	.48
Roller	4.30	32	99.61	.39
Leaf Splinter	4.24	18	99.62	.42
Whole Leaf	4.09	1	98.62	1.38

## Cold Versus Heat Processing Methods

Data suggest that the time interval between leaf harvesting and processing (sun exposure) should be minimized (less than 24 hrs); heat exposure during processing should be minimized, especially if high temperatures are maintained for an hour or more.

## Advantages of the Whole Leaf Cold Processing Methods

Advantages of the whole leaf, cold-processed, approaches include the following:

- Maximizes the yield of desirable constituents
- Increases cost effectiveness of processing
- Increased total solids concentration
- Increased polysaccharide concentrations
- Virtual absence of undesirable anthraquinones
- Improved desirable characteristics for cosmetic usage
- Increased concentration in permeability factors increasing transdermal penetration
- Improved taste palatability
- Increased concentration of growth factors responsible for accelerating of healing
- Increased concentration of factors responsible for the stimulation of the immune system

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