



Gillison's Variety
Fabrication, Inc.

Manufacturers of quality farm equipment since 1977.

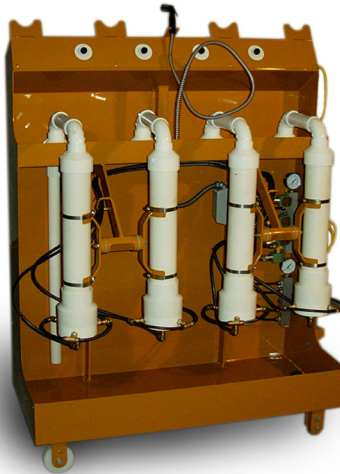
ROOTWASHER HYDROPNEUMATIC ELUTRIATION SYSTEM

Knowledge of plant root responses to both favorable and unfavorable soil conditions is fundamental to our understanding of the complex root soil interface. One of the greatest hindrances to the responses of plant roots to soil environmental conditions has been the absence of an inexpensive method for quantitatively separating the soil from roots and other biological materials.

Our system, which separates roots from soil materials, combines the kinetic energy of pressurized spray jets and low energy of air flotation. Washing times range from 3 to 10 minutes and is a function of soil texture, plant species, concentration of the dispersing agent and soaking time.

Recent advances in the application of computer technology for the rapid measurement of root systems washed free of soil and the greater need for more quantitative root data for whole plant systems, clearly indicate a greater need for the development of a precise and more inexpensive method for the rapid separation of roots from soil materials. Gillison's Variety Fabrication, Inc. has constructed a quantitative system that efficiently separates roots from compacted soils without destroying small lateral roots, nodules, and other fragile root structures. This machine quantitatively separates roots and other biological materials from soils ranging in texture from sand to clay using the principle of hydropneumatic elutriation.

U.S. PATENT APPROVED / INTERNATIONAL PATENT PENDING

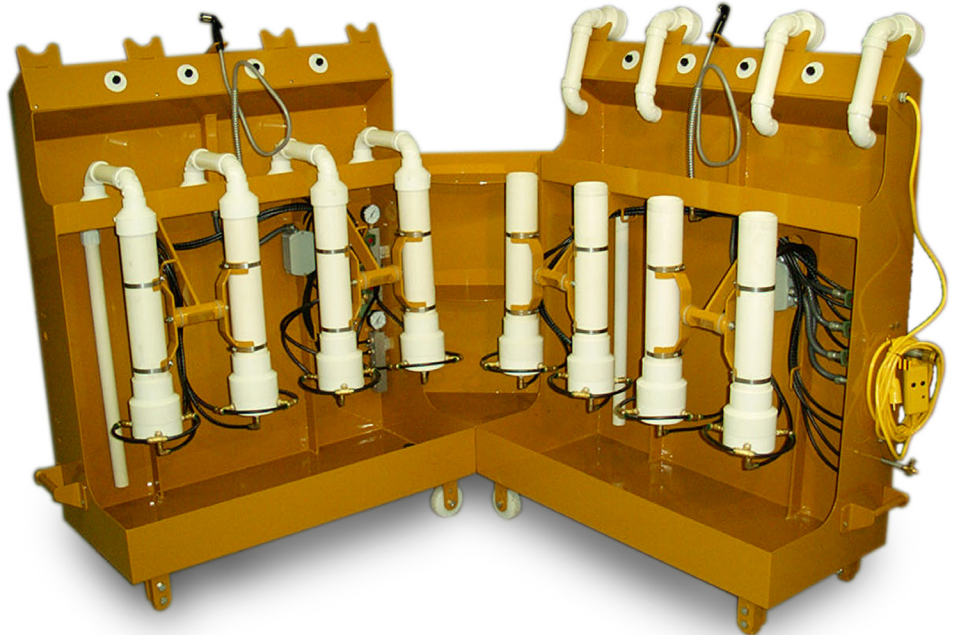


Unmatched Versatility & Dependability

A single system or a 4 chamber unit is pictured to the left.

The system shown below is an 8-chamber unit, which is simply two units hooked together in an L shape for ease of use.

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BASIC OPERATION OF THE GVF HYDROPNEUMATIC ROOT WASHER

1. Turn the air supply on and adjust pressure gauge to 7 psi (0.49 Kg/cm²) then turn the water supply on and adjust pressure to at least 50 psi (3.52 Kg/cm²). The system will function more efficiently at 60 to 70 psi (4.22 - 4.92 Kg/cm²).
2. Place soil and root samples up to 27 cubic inches (150 cm³) into tube. If clay content is greater than 50%, samples should be broken and soaked in a dispersing agent for 12 to 15 hours. Note reference listed below for details.
3. Place transfer tube on top of washing chamber and attach primary sieve (there are several screen sizes). Select proper screen size for soil particle size. Be sure screen size is small enough to retain smallest roots, yet not too small so the primary sieve becomes plugged by soil particles.
4. Set timer for appropriate run time to activate washer. Follow table below for recommended run times per sample.

Recommended Washing Times For Roots	
Soil Texture	Duration - Minutes*
Sand	4
Sandy Loam	6
Loam	8
Silty Loam	10
Clay Loam	11
Clay	12

*These times may vary depending upon the amount of organic matter, clay type, density of roots, and degree of soil compaction.

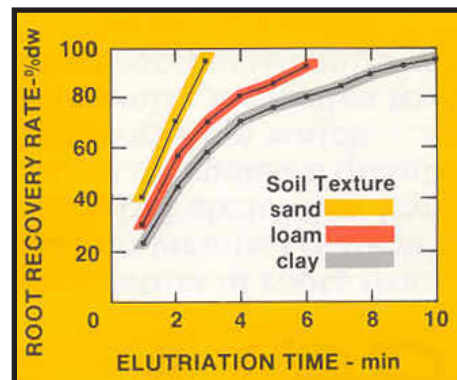
5. When timer shuts off, remove primary sieve and examine the soil particles which remain in the washing chamber for roots. If chamber is free of roots, perhaps duration of wash was too long. If roots are remaining, increase washing time until soil in chamber is free of roots. Repeat this process several times until an efficient and quantitative washing time has been established.
6. Rinse roots from the primary sieve into the secondary sieve using the sprayer at the top of the hydroelute system.
7. Remove transfer tube; empty water and soil residue from the chamber into the lower sedimentation basin by inverting the chamber.
8. Set washing timer for 30 seconds to rinse inverted tube into lower sedimentation basin.
9. Periodically remove sediment from upper sedimentation basin or flow through the primary sieves may become blocked, reducing the efficiency of the system.
10. Process root samples or preserve them in 10% formaldehyde.

For more Information visit our website:

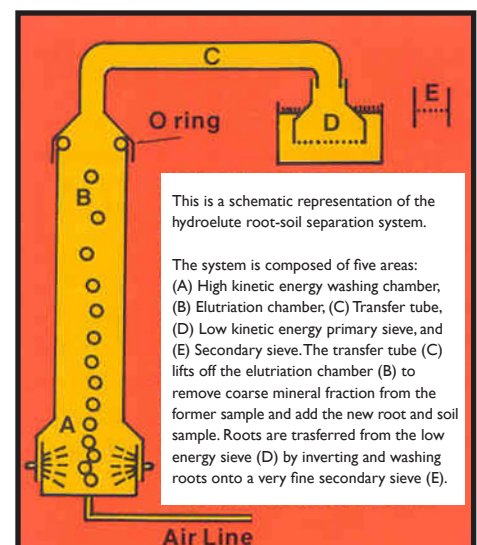
- www.gillisons.com
- Click on Products, GVF Equipment, Rootwasher

COST PER SAMPLE (U.S. DOLLARS)				
	Person (s)	Labor 1 hr.	Samples 1 hr.	Cost/ Sample
Hand Washing	1	7.25	6	1.21
Elutriation	2	16.30	75	.22

Cost Relationship Table



Time/Rate of Recovery Table



This is a schematic representation of the hydroelute root-soil separation system.

The system is composed of five areas: (A) High kinetic energy washing chamber, (B) Elutriation chamber, (C) Transfer tube, (D) Low kinetic energy primary sieve, and (E) Secondary sieve. The transfer tube (C) lifts off the elutriation chamber (B) to remove coarse mineral fraction from the former sample and add the new root and soil sample. Roots are transferred from the low energy sieve (D) by inverting and washing roots onto a very fine secondary sieve (E).

Hydroelute Root-Soil Separation System