

BASIC OPERATION OF THE HYDROPNEUMATIC ROOT WASHER

START UP

NOTE: AIR MUST BE TURNED ON FIRST AND OFF LAST

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 9 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

<u>Soil Texture</u>	<u>Duration - Minutes*</u>
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.

SHUT DOWN

1. Ensure washing chambers are flushed clean and store in an inverted position.
2. Turn off water first then air last while the washing chambers are in the inverted position.
3. Remove accumulated soil and wash out the upper and lower sedimentation basins.

TROUBLESHOOTING

1. If, during operation, a funnel shaped vortex is absent at top of the open washing chambers, then the air flow may be too great. If the air flow is appropriate (i.e., giving the appearance of slowly boiling water) then be sure the water pressure is greater than 50 psi (3.52 Kg/cm²). If the pressure is greater than 50 psi (3.52 Kg/cm²), then observe the water flow from each of the three water jets at the base of the washing chamber. This may be achieved by observing the flow of water from each jet into the empty washing chamber during the first few moments after turning the timer on. If any of the three water jets are not functioning, remove the external tubing and clean the jet with a very fine wire. When the three jets are operating properly, a vortex should be observed as the tube fills up with water and small air bubbles.

2. The air jets will become plugged by debris in the washing chamber if the source of air is turned off while the chamber is filled with water. Therefore, always turn the air on first before the washing chambers are placed in an upright position. When medium sized air bubbles do not appear at the top of a full washing tube attempt to remove the blockage by temporarily increasing the air pressure to a maximum of 20 psi (1.41 Kg/cm²). Greater pressures may damage the tubing. If the air jet remains plugged, invert the washing chamber, remove the air line and clean the jet with the aid of a very fine wire.
3. If the timers do not function, check the plug and circuit breaker. If electricity is delivered to the timer, contact Gillison's Variety Fabrication for repairs.
4. If the seal between the washing chamber and transfer tube begins to leak, remove small soil particles from below seal, examine the seal for damage and lubricate seal with silicone base lubricant. Contact Gillison's Variety Fabrication or a local dealer for replacement seals.
5. If the primary sieve overflows during the run of samples which contain large quantities of organic matter, reduce the sample size. If this occurs on very rare occasions, flush the primary sieve during the operation by the rapid upward and downward movement of the submerged primary sieve.

SUGGESTIONS FOR MAINTENANCE FREE OPERATION

1. Always turn air on first and off last.
2. Always store with washing chambers inverted.
3. Be sure to completely drain water from washing chamber water lines when stored under freezing conditions.
4. Clean and wash sedimentation chambers at the end of each day especially when dispersing agents have been used.
5. Repaint metal frame as needed.

REFERENCE

1. Smucker, A.J.M., S. L. McBurney and A. K. Srivastava, 1982. Quantitative Separation of Roots from Compacted Soil Profiles by the Hydropneumatic Elutriation System. Agronomy Journal 74:500-503.

Suggested Sieve Size for Specific Soil Types

<u>Soil Type</u>	<u>Recommended Primary Sieve Screen Size</u>
Pure Sand	930 or 1000
Loamy Sand	760 or 840
Sandy Loam	760 or 840
Loam	500 or 530 or 760 or 840
Sandy Clay Loam	500 or 530
Sandy Clay	500 or 530
Silt Loam	500 or 530
Silt	350
Silty Clay Loam	350
Clay Loam	350
Silty Clay	290 or 297 or 350
Clay	290 or 297

To determine the screen size, use the maximum particle size of 90% of the primary particles.

G V F WARRANTY

Gillison's Variety Fabrication, Inc. will replace or repair at GVF option, any GVF manufactured item that is, in the opinion of GVF, defective in material or workmanship for a period of 1 year from the date of purchase, and is returned to the GVF plant or service center at the expense of the customer. This warranty is made expressly in lieu of all other warranties expressed or implied. **The Warranty Registration card must be completed in full and returned to GVF within thirty (30) days of date of delivery to qualify for this warranty.**

The owner is specifically responsible for the operation and service of the machine. This warranty shall not apply to any product that has been subject to misuse, negligence or accident. In the event of a defect in material or workmanship, GVF sole responsibility is to the repair or replacement of the defective part and is not responsible for lost time or any other expenses incurred due to lost time.

All OEM items such as Tires, Batteries, Engines and Hydraulic components are warranted by the original equipment manufacturer. GVF controls the installation of these products but not the manufacture; therefore, GVF warranty applies to the proper installation but not the OEM component itself.

Retail Customer Responsibility: It is the Retail Customer and/or Operator's responsibility to read the Operator's Manual to operate, lubricate, maintain, and store the product in accordance with all instructions and safety procedures. Failure of the operator to read the Operator's Manual is misuse of this equipment. It is the Retail Customer and/or Operator's responsibility to inspect the product and to have any part(s) repaired or replaced when continued operation would cause damage or excessive wear to other parts or cause a safety hazard.

It is the Retail Customer's responsibility to deliver the product to the authorized GVF dealer, from whom he purchased it, for service or replacement of defective parts, which are covered by warranty. Repairs to be submitted for warranty consideration must be made within 45 days of failure. The Retail Customer is responsible for any cost incurred by the Dealer for traveling to or hauling of the product for the purpose of performing a warranty obligation or inspection.