

You can get the XXX-Tractor cold water extraction system on-line!



**INSTRUCTION MANUAL
For cold water extraction**

Pour instructions en français: visiter le site web: www.xxxtractor.com

- a) français
- b) instructions
- c) méthodes

This manual is for the 55 gal or 250 ltr. XXXtractor unit only.

For first time users, please visit our website to see the 14 gallon instructions to help you during the process. **There are no instructions available for the 55 gallon system at this moment.**

NOTES:

1) **RINSE AND WASH YOUR BAGS WITH COLD WATER ONLY, HOT WATER WILL MELT THE TRICHOMES TO THE MESH AND CAUSE BLOCKAGES. IF MESH BECOMES BLOCKED, CLEAN WITH PURE ALCOHOL.**

CAUTION: IF YOU MUST USE ALCOHOL TO CLEAN YOUR MESH, MAKE SURE TO RINSE AFTER WITH COLD WATER (LETTING THE BAGS DRY OUT WITH A SOLVENT MAY DAMAGE THE SILK FILTERS.)

2) RINSE AND WASH YOUR BAGS IMMEDIATELY AFTER USING SO THAT NO MATERIALS DRY AND BECOME BLOCKED INTO THE MESH.

3) Rinse the outside of the red into orange bag, then the orange into the yellow bag to remove any trichomes that may be stuck to the outer surface.

4) Pouring the water from the bucket through all three bags again (plant mass included) will yield a little bit more product. (Not sure if the results justify the time. Judge for yourself).

5) Keeping the water as cold as possible is important, this allows the trichomes to release from the plant matter.

6) These instructions are not written in stone. If followed, they will insure good results (also depends on the amount of trichomes on your plant matter). Feel free to experiment with the process, any feedback to improve this method would be greatly appreciated.

IMMEDIATE CAUTION: (please read before starting)

DO NOT LET BAGS FREEZE AS IT MAY CAUSE IT TO CRACK (ALL)

DO NOT CHOP AND GRIND THE PLANT MATTER BEFORE THE PROCESS AS IT COULD DAMAGE THE TRICHOMES ON THE LEAVES. (ALL)

FOR 55 GALLON :

ONLY A FEW INCHES OF WATER SHOULD REMAIN BEFORE HOISTING THE BAGS.

(NOTE) THESE BAGS ARE NOT MADE TO SUPPORT ALL THE WEIGHT IT CARRIES DURING DRAINING PROCESS.

DO NOT MIX THE PLANT MATTER AT THE BOTTOM OF THE BAG, AS YOU MAY DAMAGE THE SCREEN.

AVOID HITTING THE SIDES OF THE BAGS DURING MIXING. MIXING IN THE MIDDLE OF THE BAGS WILL PULL ALL OF THE PLANT MATTER INTO THE MIXER

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Cold Water Extraction of Leaf Trichomes from Oregano and Lavender

Trichomes are ubiquitous plant structures found in leaves, stems, roots, and flowering parts. These specialized epidermal hairs may have several functions in plant physiology, including protection from dehydration and predators, oil secretion, absorption, and even light-reflection. In this paper, we propose a simple cold-water extraction system for the leaf trichomes

of two household plants, oregano and lavender. The trichome extracts obtained were enriched in essential oils and could potentially be used for a variety of purposes, including essential oil preparation, fabrication of incense and scented candles, flavoring agents for cooking, and fragrances in cosmetic products like perfumes or soaps.

The following show two common types of oil rich, glandular trichomes (in this case from Lemon Basil):



INTRODUCTION

Trichomes are microscopic specialized outgrowths found along many plant surfaces, they are primarily designed to increase the plant's chances of survival. In leaves, trichomes have been shown important in the prevention of excessive moisture loss and as a defense against herbivores. Tuberville and Dudley reported a decrease in the rate of activity of invertebrates across leaves rich in trichomes. Stinging trichomes are also known to defend plants against grazing from mammalian herbivores.

While these accessory structures occur most often along stems and leaves, they can also be found on the surface of petals comprising the sweet fragrances that draw pollinating insects and birds. Other forms of trichomes may help adjust the "microclimate" on the surfaces of the leaves by reflecting solar radiation and prevent evaporation and critical loss of water from leaf tissue. Trichomes with curly shapes have been developed for use as light "reflectors" by many plants adapted to desert habitats. In plants found along salt marshes, leaf and stem trichomes may even be involved in excretion of salts from the plant. Each variety of plant produces trichomes most suited to cope with the specific conditions of its environment.

MATERIALS and METHODS

Leaves from *Origanum Heracleoticum* (Greek Oregano) and *Lavandula Angustifolia* (English Lavender) were air-dried for 12 hrs. at 100 °F in a Dehydrator 2400 from American Harvest Co. The dried plant matter was then pre-chilled in a freezer for 20 min. prior to the trichome extraction process. The exclusive "triple-extractor", cold-water system was used for leaf trichome extraction (See HOW TO on the web for more information.)

The triple-extractor involves 3 inter-fitting nylon bags, each having a different size screen mesh at the bottom. Largest mesh diameter (inner red bag) of approx. 220 μm ; intermediate mesh size (middle orange bag) = 83 μm ; smallest mesh (outer yellow bag) = 25 μm . Since most trichomes are between 30 to 120 microns in size, they would normally pass through the red bag's mesh, but would effectively be retained by the intermediate and small size meshes of the orange and yellow bags.

The dried, pre-chilled plant leaf matter was then poured in ice-cold tap water and vigorously blended for 15 min. using a typical hand-held kitchen homogenizer. Vigorous shaking is required to release the glandular trichomes from the surface of the leaf. The temperature must always be kept at 4 °C for optimal results. Essential oils include mostly aliphatic or aromatic alcohols, ketones, and esters, which do not normally dissolve in cold water. The water will however dissolve chlorophyll and other undesirable hydrophilic substances found in leaves.

Following rigorous blending, the three bags (immersed in an outer plastic bucket full with ice/water) were kept refrigerated for another 30 min. prior to cold water washings. The orange and yellow bags were then thoroughly flushed with cold water to rinse out the collected trichomes. The trichome fractions from each plant were finally pooled and freeze-dried to determine yield and qualitative properties.

CONCLUSIONS

The cold water, triple extraction system was found to be a simple, cost-efficient and safe method for collecting the leaf trichomes of aromatic plants like oregano or lavender. The trichome fractions were highly scented, they also displayed an oily texture upon handling (trichome yields averaged around **10%** of the dry weight of leaves.)

The triple extractor functions to enrich trichomes through a series of meshes which exclude water-soluble compounds (ex. chlorophyll) and remove fiber-like materials containing cellulose and hemicelluloses. On the other hand, glandular trichomes (30-120 μm) can be retained by smaller mesh sizes, thereby providing a simple physical means of collecting essential oils from household plants.

While resolution of trichomes for morphological classification may require more sophisticated microscopy, simple characterization of trichomes was done with a small dissecting microscope (30X). Examination of the fractions obtained from oregano and lavender revealed considerable enrichment in trichome structures. Both yellow and orange bag extracts were abundant in stalk-shaped glandular trichomes, with yellow bag extracts (mesh size 25 μm) being darker in color, probably due to greater content in essential oils.

Results showed the efficacy of cold water extraction to obtain "essential pastes" or trichome-enriched fractions from the leaves of common aromatic plants. The triple-extractor process may ultimately prove to be simpler and less costly than traditional distillation or extraction with organic solvents.

We propose that purification of trichomes from aromatic plants and culinary herbs using this technique may have multiple applications in the preparation of essential oils, food flavoring agents, and products like soaps, perfumes, natural toothpaste, fragrances, incenses, scented candles, etc.

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