

## First Plant Distillation



### *Preparing for your first plant distillation is a journey to embrace....*

For your first distillation, I recommend keeping it as simple as possible and to remove all judgement about doing it right or not right. Whatever happens during your first distillation is all a part of the learning process. Relax, observe, enjoy the experience.

I typically devote two to four days to each distillation. Prior to scheduling a harvest and distillation, I always check the weather to make sure it will be a 'go' for the days planned. If weather looks good, distillation preparations begin a day or two before harvest day.

### **The Distillation / Plant Journal**

I highly recommend beginning a journal as soon as you get your still and begin making preparations for your first distillation. I have been keeping a distillation plant journal for a couple of years now. A sample outline of information to include is covered below. I also use this journal to note when different plants are typically ready to distill (e.g. spring nettles - mid-April and May, monarda - mid to late May into June, goldenrod - mid to late July, early August, etc.. ). Each year I feel more ready and aware of the cycle of the plants I am growing as well as in those that grow abundantly in the natural landscape of where we live in North Carolina. I make sure to note where I have found batches of wild species growing that I could harvest too. (e.g. Stumbled across a large patch of wild native bergamot growing in the mountains, not too far from the beautiful river - it was early July - harvest time may be closer to mid to early June - check next year.)

Once a distillation is 'scheduled', I use the first day (and I use this term a bit nebulously) to prepare the distillation space. During this day, I will set out the table/s, clean and clear space outside (or in, depending on where I am distilling), clean the cooler (which will hold the water for the condenser), and the still (if it needs it), and make sure I have everything I need such as: teflon tape or rye flour, water (I purchase water in a 5 gallon container from our local coop), and extra propane tank, just in case! \*\*If distilling inside, do not use propane, use your gas or electric stove top or an electric stove plate. Collect other supplies as needed.

Sometimes the first or second day is spent exploring the specific plant I am about to distill and writing about the plants virtues, energetics and medicinal therapeutics, botany, and other thoughts or observations about the plant. **It is of great importance that you know what you will be distilling and when it will be ready. Only harvest and distill plants you know and are familiar with.**

**Harvest and Distill Day:** The second or third day is harvest and typically distillation day! The reason we may not distill on the same day as harvest day is if we need or want to macerate the plant material.

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**About Macerating:** Roots, seeds, needles, bark, and resins all benefit from undergoing maceration prior to distillation. To macerate plant material, fill your distillation pot with warm water to appropriate level (approx. 1/2 full), add in prepared and weighed plant material (with roots, bark, needles, cut into pieces - with seeds, gently crush), place hat on, and allow to soak overnight. You can macerate for up to 48 hours. This allows time for a maximum quantity of hydro-soluble molecules to enter the water in preparation for the distillation. It is a good way to soften the hard lignin material of woody plant parts such as barks, needles, roots, resins, and seeds enabling the essence vesicles to open more easily during distillation.

*"Take what herbs, flowers, or roots you please (so that they be green). Bruise them and mix with them some leaven, and let them stand close covered for four or five days. Then distill them after the manner aforesaid."*(10)

Cathy found the quote above in an old English alchemical text about distilling. The aim was to obtain the 'full smell and virtue of the vegetable'.

Once the material is macerated, you will then begin the process of distillation.

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## The Harvest

After the sun has warmed the dew off the plants, I begin either harvesting our cultivated plants or head out to a location to wild harvest. If you are traveling, make sure you have your still set up and ready to go once you return with your plant material or if you need to travel more than 1/2 hour away, consider bringing your distillation unit (and everything you need on a basic level to distill) with you! Depending on what you are harvesting and where, you may need the following tools:

- knife
- scissors
- hori hori knife (for roots)
- basket/s or paper bag/s
- an offering \*Be sure to leave an offering to the plant before departing with your harvest.

## When to Harvest and Distill

Typically we harvest aromatic or medicinal plants from spring to early autumn, depending on the plant and of course, your climate. Conifers and roots may be harvested in the autumn and winter months. When to harvest a specific plant is another part of the journey of distillation. Sometimes I am mindful of the phase of the moon, sometimes I feel called by a particular plant (they say: I am ready, harvest and distill me soon!) lol....but really, they do!

As a general rule of thumb: most plants are harvested either just before flowering or just after and during the flowering phase.

For those of you who are aromatherapists, you will be familiar with the fact that the timing of a harvest can radically alter the chemical composition of any given essential oil and hydrosol. Since we won't be able to test every single batch nor would this necessarily be desirable, we can begin to note in our distillation journal, changes or differences we experience when distilling the same plant species at different times and under different weather conditions or even areas of growth, etc. This act of observation cultivates a more intimate and direct relationship with the hydrosol and the plants natural cycles of altering its chemistry in relation to its environment and through the seasons. Distilling is an art and it takes time to cultivate a deep rich understanding of how plants change with the seasons, time of harvest, etc.

Distill when the weather is and has been warm and dry. Most plants will have a rich essential oil content on warm/hot days. We do not recommend harvesting and distilling on a rainy day or just after heavy rains. Wait for the plant material to dry completely from the rains.

Commit an entire day to harvesting and distilling. It is a physical and energetic process that relishes in being given time to unfold. If you have planned a day of distilling and awake 'just not feeling into it' or if you are in a rush, take a day off and reschedule until you can create a better day to distill.

## Steps to Distill Plant Material:

Once you have returned with your harvest, you will prepare the plant material. Remember, at this point, your still should be all set up and ready to go.

### Check List for Distillation Unit

- \_\_\_\_\_ Distillation pieces on table.
- \_\_\_\_\_ Pot on heating source.
- \_\_\_\_\_ Tub/Cooler filled with water.
- \_\_\_\_\_ Condenser hoses connected \*the lower hose connected to pond pump.
- \_\_\_\_\_ Prior to preparing plant material, make up a batch up rye flour paste, if this is what you will be using to seal the still. Otherwise, you can use teflon tape.
- \_\_\_\_\_ Collecting jar/glass/separatory funnel on separate table in front of condenser spout.
- \_\_\_\_\_ Test pH of water to be used.
- \_\_\_\_\_ Have scale on table to weigh plant material.
- \_\_\_\_\_ Notebook

## 1. Prepare Plant Material

The Lamiaceae family of plants (peppermint, lavender, oregano, thyme, etc.) can all typically be harvested and distilled with ease. The great thing about this family of plants is, depending on where you live, you may be able to harvest 2 or 3 times throughout the spring/summer/early autumn. Often the Lamiaceae species are harvested just after flowering or just before. Experiment with timing of harvest, explore, observe and be sure to take notes in your distillation journal!

With waxy leaves (not the lamiaceae family), needles, bark, and grasses, we tend to cut them up a bit prior to placing them in the still, even if we will be macerating them. For roots, wash them gently, then cut them into 1 inch pieces, then weigh and place into still. It is good to macerate roots for up to 48 hours prior to distillation although we have distilled sassafras root almost immediately after harvesting and obtained most intricate and beautiful hydrosol. Try both ways with the same and different plant species!

Once you have harvested, remove the leaves and flowers and place into a bowl or bag so you can weigh the plant material once it is ready. You may also choose to fill the pot and/or column so you can make sure you have enough plant material.

## 2. Packing a Still

The art of packing a still takes a little practice but as your practice, observations, and experience grows, you will begin to have markers of how much plant material you will need to distill in your specific still.

If you are using the column to distill, you want to place the material in the column and press gently down but not stuffed or packed to hard, being mindful to layer the plant material so that

there is space between the material (not too much space, though). You want to ensure there is still space for the steam to pass through the plant material. Just remember, too little plant material will result in a weak hydrosol, too much plant material and you run the risk of a blow out.

If you are performing a hydro-distillation, I recommend filling the pot with the plant material as you prepare it to make sure you have enough plant material as well as to measure quantity needed to 'fill' the pot about 1/2 full when gently pressed (handles are the top point of measurement). Then remove plant material and weigh. Place plant material back into pot and then add water as you measure or weigh it.

Conversely, you could also experiment with filling the pot with water (measuring it, of course) to approximately half, then add in weighed plant material directly to water. Use a long wooden spoon to stir the plant material with the water. The plant material should be able to move around. It should not be hard to stir. If you need to add more water, do so..... If you need more plant and it is close by, add more plant material. Hopefully, this does not happen if it is a wild crafted plant where this would not be possible. If it does, distill with what you have and observe the hydrosols qualities. Knowing how much plant material you will need is a part of the journey of learning about your still and distillation!

If using column, place column on with plant material weighed and placed within, on top of the water/plant material in the pot. If you are doing a simple hydro-distillation then connect hat directly to pot and then connect swan neck and extension tube to condenser.

### **3. Next Steps.....**

- Seal joints with rye flour paste or teflon tape.
- Turn on heat, medium.

This is a good time to finish any notes in your journal. Watching as the water heats up, observing, taking notes, writing about what your experience is, or even reading about the plant.

### **4. Heating Things Up**

As we have shared, distillation is a journey. And learning how to work effectively with the temperature of the still is a part of that journey. Begin always with medium heat and reduce as needed. How do you know it is too hot? There are a couple of ways of exploring temperature: 1/ have a thermometer attached to your still (some stills have this built in) or 2/watch the flow of hydrosol. The flow should come up in little spurts and droplets. If it is flowing out, then the heat is too high and should be turned down lower. Distillation time will vary from plant to plant with the average being 2-5 hours, again, depending on the plant material, the type and size of still you are using, and the type of distillation you are doing.

Temperature influences the speed of distillation. The hotter the temperature, the faster the water is heated and the quicker the distillation will take place, at the cost of destroying certain fragile aromatic molecules. A low temperature and pressure in heating the water results in a slow gentle distillation that takes longer but can preserve certain fragile aromatic essences by protecting them

from being transformed or decomposed by too much heat, too fast. I advise paying a little bit extra and buying a still with a thermometer on the cap as this will enable you to judge where you are in the process, depending on the temperature and allows you to regulate the rate at which the temperature rises. Droplets of hydrosol start coming out of the still when the temperature reaches approximately 100 degrees C (212F). Atmospheric pressure and altitude can slightly influence the boiling temperature of water and steam and thus the temperature of the distillation.

Distillation should be slow and lengthy. This is one of the criteria that differentiates 'artisanal' from industrial distillation. A slow distillation is necessary in order to collect the complete profile of the volatile aromatic molecules. The aromatic molecules come out of the still at different stages of the distillation depending on their molecular weight. The lightest molecules known as the 'top' or 'head' notes in French come out first, followed by the 'middle' or 'heart' notes and lastly the 'base' or 'tail' notes, which are the resinous, earthy notes from heavier molecules. These heavier molecules with 15 to 20 carbons take longer to be extracted. As in most businesses, 'time is money' in industrial distillation and this last, heaviest fraction of the aromatic whole is often left out, in the interest of saving time.

Even though certain molecules occur in minute amounts they can have profound synergistic effects with the other molecules present in the hydrosol. In general, synergetic effects can enhance the therapeutic properties and decrease the probability of side-effects. There are several reasons for this: Molecules can amplify each other's therapeutic effects and cancel out each other's toxicities. Therefore overall smaller amounts of molecules are needed for the same action with less toxicity.

The French concept 'totum' is based on the notion that all the volatile molecules in a plant could be extracted and that the total extract is the ideal. We propose a novel way of looking at the ideal hydrosol distillation: The distillation that maximizes the synergy of the constituents, which doesn't necessarily imply the maximum yield of each constituent, but the amounts that maximize synergy. There could be constituents that maximize their synergy at a 'sweet spot' somewhere between low and high concentrations and some constituents may be more synergistic at lower concentrations.

## **5. The Flow of Aromatic Waters**

The hydrosol drips out of the coiled tube in the condenser and needs to be collected. I use a clean glass collecting bowl for this purpose that is used only for this task. If you collect several containers full of hydrosol in the course of a distillation, perhaps because you don't have a big enough container to collect the complete distillation, don't forget that they need to be mixed together again before being bottled so that the finished hydrosol is complete and the entire batch contains the top, middle and bottom notes. A hydrosol will develop its odour over the following days and sometimes even weeks and therefore it should be allowed to 'rest' for a week to a month. It is considered stabilised with regards to the odour after about three weeks. Some people however think that hydrosols and essential oils distilled in copper stills develop their final odour more rapidly than those distilled in stainless steel stills.

## 6. Ending the Distillation

Different plants take different amounts of time to distill and also have different yields. There is an approximate rule-of-thumb for hydrosol yield, which states that one kilogram of plant matter should yield one liter of hydrosol. This is however only an approximate guideline and not firm. In my experience every distillation is different even with the same plant. It is up to the distiller to decide when to stop the distillation, based on careful observation and experience. This takes practice. If distillation is stopped prematurely, the bottom notes due to the heavier molecules will not be collected and the hydrosol will be incomplete. If distillation is stopped late, the hydrosol will be too dilute, because too much steam has been generated.

It is easier to know how long to distill an essential oil as the oil since there are guidelines about length of distillation depending on the plant, for example: it takes about an hour and a half for lavender and around twenty hours for vetiver. It is interesting to note that industrially distilled lavender is done so in fifteen minutes!!! Furthermore, since the essential oil separates from the water as they do not mix, there's no risk of over-diluting an essential oil by distilling for too long.

## 7. Filtering, Testing, Tasting, and Storing the Hydrosol

Hydrosols should be filtered and then bottled preferably in airtight, dark, glass bottles, stored protected from sunlight and heat and kept in a cool, dark place, at a temperature of between 14-17 degrees such as a cool cellar. Many people keep their hydrosols in the fridge. I advise those of you thinking of working professionally with hydrosols to buy a small fridge designated uniquely for this in order to avoid mixing hydrosol and food together, as the odor of the food can taint the hydrosols.

### Shelf Life of Hydrosols

Hydrosols, being water-based, tend to have shorter lifespans and you need to pay more attention to cleanliness and proper storage and handling in order to avoid any bacterial contamination. In France, assuming proper technique, hydrosols are considered to have a shelf-life of one year, but in reality this depends very much on the plant. Plants with very strong anti-bacterial and anti-infectious properties due to high quantities of phenols such as *Satureja montana* (winter savoury) or *Origanum vulgare* (oregano) help preserve their hydrosols. I have many that are over four or five years old and still very stable and unchanged.

Hydrosols made from non-aromatic plants such as *Plantago* sp. (plantain) or *Urtica dioica* (nettle) tend to have a shorter shelf-life and should be used within 2-3 months of distillation.

It is thought that pH and reduction-oxidation levels are the main criteria that determine the shelf-life of hydrosols. For example hydrosols that are more acidic (low pH) and have a high reactivity or potential for reduction (Rh2 or redox) have a tendency to oxidize more quickly and thus degrade. I have experienced this on several occasions with hydrosols of *Laurus nobilis* (bay).

Once a hydrosol storage bottle has been opened it is a good idea to keep as much oxygen out of the bottle as possible. This can be done by using a wine bottle vacuum pump, used for keeping oxygen out of opened bottles of wine or more simply you can just decant the remaining hydrosol into a smaller bottle.

Another common problem that hydrosols can develop is an algae that look like white woolly, floating filaments. These can be simply filtered, if the hydrosol still has the proper smell. These filaments tend not to appear in hydrosols that contain high quantities of aromatic constituents, which have antiseptic and preservative properties. Many think that hydrosols made in copper stills have a longer shelf life than those made in stainless steel stills.

Bear in mind that the cleanliness of the still and related apparatus is probably the most important consideration to prevent the premature degradation of hydrosols.

### **Note: Criteria for High Quality Distillation**

The word 'distillation' comes from the Latin word '*destillare*' meaning 'to trickle down drop by drop.' Distilling takes practice. When distilling, you must stay with the still at all times, observing and accompanying the procedure. In order to obtain the highest quality of hydrosol, both on a physical and energetic level, you have to pay close attention to all the factors, from harvesting the plant, to the quality of water used, the distillation itself and the bottling and preserving. In the section below I focus on the distillation process.

As hydrosols are a water-based product, you need to pay close attention in both the distillation and preservation processes to preventing bacterial contamination. First and foremost is the cleanliness of the still, tubing, collecting vessels, and work surfaces used in the distilling process.

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***Next Post.....How to Clean Your Still***

# The Distillation Notebook

We always believe that we will remember all the information and observations whilst we are actually in the throws of the process, but it is amazing how quickly details can be forgotten. Good record keeping is crucial to good hydrosol distilling!

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**Date:**

## The Plant

- **Plant:** include Latin binomial, botanical family, and common name, e.g. *Monarda fistulosa* (Lamiaceae) Monarda. It is extremely important to be sure of what is being distilled. Precise identification of the plant from which material is harvested is vital to avoid mislabeled and potentially toxic hydrosols.
- **Part of Plant:** leaves, flowers, seeds, etc., Include description of what stage the plant was at when you harvested it (e.g. just before flowering, after flowering, etc.). Different plant parts produce different chemical compounds and do not necessarily have the same therapeutic actions. It is therefore important to indicate which part of the plant the hydrosol has been produced from. For example, the essential oils of neroli, bitter orange zest and petitgrain bigaradier are all from the same plant, *Citrus aurantium var. aurantium*, but they do not contain the same constituents. Neroli contains between 40-45% monoterpenes, around 40% linalool (monoterpenol) and a small amount (<5%) nerolidol (sesquiterpene), Petitgrain Bigardier contains approximately 30% monoterpenols and between 30-60% esters. Bitter orange zest contains between 80-90% limonene, which is a monoterpene. It is obvious that they are not going to have the same therapeutic actions nor produce the same hydrosol.
- **Harvest description:** Wild harvest or cultivated crop harvest location and time of day you harvested.
- **Weight:** weight of plant material to distill. \*\*Getting a sense of how much plant material will fit into the still or bottom basin takes time, lots of distillation experience, and keen observation and documentation. I typically fill either the neck or the tub with the plant material to where I think it is enough, then remove it into a bowl on a scale, note the weight, and move back into still.

## The Still

- **Size of Distillation Unit:** e.g. 20L still or 40L still
- **Type of Distillation:** Depending on the type of distillation unit you have, you may be able to perform: hydrodistillation, steam distillation, or a combination of the two.
- **Water source and pH of water:** e.g. spring water from coop, 5.9 pH
- **Quantity of water** added into still: weighed or measured by liquid
- **Yield:** Quantity of hydrosol at end of distillation. It is interesting to note the yields for each distillation as these can be compared to the other factors noted and so the conditions that give the highest possible yields can be reproduced.

- **Time:** be sure to mark down what time you began to heat the water, how long it took for the distillate to begin 'flowing', and when you stopped the distillation process. Date/time/ambient temperature and other situational factors (moon phase, weather conditions) are useful for comparing distillations of the same plant carried out at different times of the year, day and in different locations and climatic conditions.

## The Hydrosol

- **Lot number or batch number:** Lot number or batch number enable one to look up all the details about a certain hydrosol batch. If after a certain time a hydrosol is showing signs of contamination or degradation, by having the lot number, you can refer back to the conditions of its distillation and check the other hydrosol stock from the same batch. For people commercially producing hydrosols, this then enables them to recall any contaminated batches. The ability to do this is a legal requirement in Europe for manufacturers of hydrosols.
- **Taste, color, and aroma impression:** It is important to take the time to note these impressions as they may be useful to review if there is a problem with a batch and for comparing batches. The taste and aroma of a hydrosol will also mature as it ages.
- **Energetics:** Behind our senses, in this case those of taste and aroma lie the feelings they incur. It can be very interesting to go beyond the senses and feel where the energy of the hydrosol goes in the physical body, how does it make one feel, what emotions and other information come to you intuitively.
- **Appearance:** Another important aspect to record Does the hydrosol have a milky aspect, is it clear, is there any copper precipitation showing, etc.?
- **Observations:** Anything else that does not fall into the above categories can be noted here.