

# Innovation from the Northwest Rainforest

Emerging sources of natural ingredients provide perfumers with new olfactive opportunities

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Like architects, painters and other artists, perfumers seem to have a special appreciation for nature. This is perhaps an uncontroversial point. After all, it's nature from which essential oils are derived, providing unmatched complexity and uniqueness. These facets mean that natural ingredients, particularly essential oils, continue to be an important tool in the perfumer's toolkit.

The number of essential oils available to perfumers, however, is modest. Compared with the thousands of synthetic fragrance ingredients on the market, the number of essential oils totals just a few hundred. And many of these oils have supply problems, are very expensive or face regulatory pressures. As a result, few oils end up being used over and over again. One of these exceptions, cedar oil, has reportedly been found in more than 60% of commercial fragrances.<sup>1</sup> Like many natural ingredients, it's familiar to virtually every perfumer, from the most senior to the most junior.

The widespread use of many essential oils has its downside, particularly when the goal is to create innovative new fragrances. A perfumer can, of course, create a new fragrance using well-worn ingredients, but familiarity makes the job more difficult. A new ingredient can often provide a perfumer with just the spark needed to create a new fragrance for his or her company and a point of difference for the customer.

This sort of innovation is needed right now. The weak global economy has resulted in cost-cutting across the board by companies inside and outside the fragrance industry. But such a strategy is not sustainable. Sooner or later, relentless cost-cutting leads to destructive competition—margins erode, profits slide and companies are forced to innovate or die.



The Northwest Rainforest of British Columbia, Canada presents an emerging source for differentiating natural fragrance materials.

It is, of course, easy to say that innovation is necessary. And it's easy to say that new ingredients are necessary to facilitate this innovation. The hard part is finding out exactly where such new ingredients are to be found.

## The Northwest Rainforest

The Northwest temperate rainforest is not particularly well-publicized. It might be an exaggeration to suggest that most people don't know that it exists, but not entirely. In any case, it's certainly not as well known as its tropical counterpart in South America. For perfumers and fragrance executives, it should be.

The Northwest rainforest is a diverse ecological region that spans from southern Alaska to northern California; the majority of the forest is found in British Columbia, Canada and Washington State. The region is home to hundreds of plant species, many of which contribute to the unique olfactory experience of the Pacific Northwest. Some of these plant species are small botanicals familiar to perfumers—spearmint, peppermint, artemisia, tarragon and citrada. Others are massive tree species indigenous to the Pacific Northwest. These indigenous tree species have been used for more than 100 years by the local forest industry as a source for timber and lumber; this timber and lumber processing produces millions of tons of sawdust in the region each year. This sawdust is currently being burned as an inexpensive source of energy but it could just as easily be used as a raw material for the production of essential oils for the fragrance industry. This opportunity has not been lost on suppliers.

A number of companies have begun to produce ingredients in the region, including Northwest Aromatics, Trivan Essential Oils, Sunwest Ingredients and Forbes Medi-Tech. Northwest Aromatics is focused exclusively on the essential oils of tree species in the Pacific Northwest, including conifers such as Sitka spruce (*Picea sitchensis*), coastal Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), Western Hemlock (*Tsuga heterophylla*), Nootka cypress (*Callitropsis nootkatensis*) and giant arborvitae (*Thuja plicata*). These trees are indigenous to the region and contain unique chemical constituents that contribute to their distinctive aromas. This article will focus on two of the most interesting sources, Nootka cypress and giant arborvitae.



*Nootka cypress and giant arborvitae oil have both played important roles in the cultures of First Nations and Aboriginal peoples of the Pacific Northwest.*

## Nootka Cypress and Giant Arborvitae

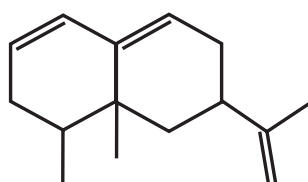
It is fitting that Nootka cypress and giant arborvitae oil are the first essential oils to be commercialized from the Northwest rainforest. Both oils come from species that have a deep cultural significance for the First Nations and Aboriginal peoples of the Pacific Northwest. Totem poles, canoes and other ceremonial carvings employed giant arborvitae; the latter word translates as “tree of life.” Nootka cypress—also known as Alaska cypress, and named for the Nootka tribe (now known as the Nuu-chah-nulth) from the area known as Nootka Sound—has played an important role in native culture of the Pacific Northwest. Its major constituents are profiled in **F-1**.

Both oils have unique aroma profiles. In the Nootka cypress oil, cedar notes are accompanied by spicy and citrus notes. The major constituent is nootkatene (CAS# 5090-61-9), which makes up approximately 50% of the oil and is closely related to valencene (CAS# 4630-07-3) and nootkatone (CAS# 4674-50-4), both of which are also present in the oil. Surprisingly, nootkatone—the expensive sesquiterpene found in trace amounts in grapefruit peel—is found in Nootka cypress oil in quantities as high as 5%, giving the oil a distinctly grapefruitlike aroma.

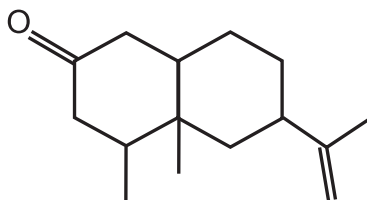
Giant arborvitae oil also has strong cedar notes, but here they are accompanied by mossy notes and a fruity note reminiscent of cherry. The major constituent of the oil is the seven-carbon ring molecule methyl thujate (CAS# 54598-10-6), which makes up approximately 50–65% of the oil and is responsible for its clean and fruity aroma. The remainder of the oil consists of a closely

### Major constituents of Alaska cypress

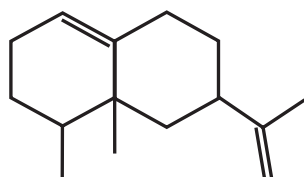
**F-1**



**Nootkatene**



**Nootkatone**



**Valencene**



*Nootka cypress; Callitropsis nootkatensis.*



*Giant arborvitae; Thuja plicata.*

related molecule known as thujic acid (CAS# 499-89-8) and approximately 5% of hinokitiol (CAS# 499-44-5), an antimicrobial used in foods and cosmetics. **F-2** profiles key giant arborvitae oil constituents. Both oils are currently undergoing regulatory registration.

## Sustainability

New ingredients with unique and pleasant aromas are great, but too often such ingredients come from areas of the world where sustainability standards are either poor or nonexistent. This is not the case with ingredients derived from the Northwest rainforest. A 2003 independent study conducted by Yale's Benjamin Cashore and Constance McDermott compared British Columbia's environmental forest practice regulations with those practiced in other



*Renewable sawdust being processed at Northwest Aromatics' multi-ton production facility.*

parts of the world.<sup>2</sup> Cashore and McDermott's study concluded that British Columbia "takes a stringent approach to forest policy, regulation development, and on key measures we compared, is among the top of the 38 jurisdictions we studied from around the world." Specifically, British Columbia's forests are 95% government-owned, and its annual allowable cuts are based on sustained-yield principles. The region, which has more certified forest lands than either Sweden or Germany, is a leader in designating protected areas and in third-party sustainable forest management. Suppliers in the area are committed to making the production of regionally derived essential oils more than a cottage industry

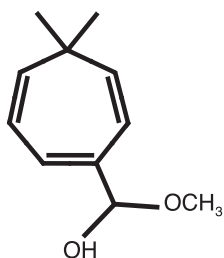
## In Summary

The availability of natural and sustainable ingredients from the Northwest temperate rainforest comes at an important time for the fragrance industry. With the global economy continuing to struggle, the need for innovation and differentiation is strong. New ingredients can play an important role in facilitating this innovation.

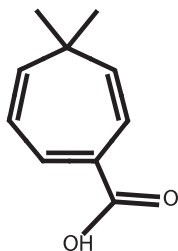
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## Major constituents of giant arborvitae

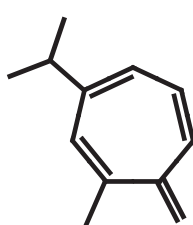
## F-2



**Methyl thujate**



**Thujic acid**



**Hinokitiol**

## References

1. WM Ciesla, *Non-Wood forest products from conifers: Essential Oils*. United Nations Forestry & Agricultural Organization FAO (1998)
2. B Cashore and C McDermott, *Global Environmental Forest Policies: Canada as a Constant Case Comparison of Select Forest Practice Regulations*. International Forest Resources (2004)

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