Siberian Fir Needle Oil *(Abies Sibirica L.)* from Kazakhstan

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The young republic of Kazakhstan, formerly part of Soviet Russia, is taking its place in the world market. It's one-third the size of the US and rich in natural resources, including oil, minerals, and wood products.

We were in Ust-Kamenogorsk recently, a city in the eastern region of Kazakhstan, as volunteers for the IESC on a project for the production, quality control and marketing of essential oils and other products from the Melissa Co.

As a major producer of wood logs and lumber from fir, pine, birch and poplar, the company's general director, Alexander Vorobiyov, has a growing interest in valued-added products and by-products from these same natural resources. As the export of fir and pine logs to China and other countries grows, so does the capacity for the production of pine needle oil *(Pinus sylvestris L.)* and Siberian fir needle oil *(Abies Sibirica L.)*.

Production quantities for Siberian fir needle oil in recent years have reached 100 metric tons. Small quantities of pine needle oil and birch tar are available as well in trial quantities of essential oils from native botanicals harvested in the wild.

Trial quantities of essential oils from the branches of *Juniperus communis L.*, the roots of *Acorus calamus L.*, the roots of *Angelica archangelica L.*, and the leaves of *Artemesia vulgaris L.* have been produced.

Other native botanicals with essential oils of potential interest include: burdock root *(Arctium lappa L.)*, sagebrush *(Artemesia tridentata Nutt.)*, pot marigold *(Calendula officinalis L.)*, melissa balm *(Melissa officinalis L.)*, peony root, St.John's wort *(Hypericum perforatium L.)*, onion root *(Allium cepa L.)*, wormwood *(Artemesia absinthium L.)*, and mint.

Trip to the Forest

The fir logs and essential oils of *Abies Sibirica L.* are harvested and produced in standing forests about 80 kilometres northeast of Ust-Kamenogorsk. The days in June in this region vary from cold, windy days to the more typical warm, sunny days with gentle breezes.

The route to the fir forest passes a large titanium and manganese metal-production factory on the outskirts of Ust-Kamenogorsk followed by small farming villages. As the roads become nearly impassable dirt pathways crossing narrow streams, a four-wheel drive vehicle is required to reach the fir forests. Along the way, there are cultivated fields of potatoes, wheat and sunflowers, and uncultivated fields of native botanicals.

The entrance into the fir forest is a sudden one. The forests remain thick due to the environmentally sound harvesting and replanting techniques employed to allow new growth and more sustainable trees.

The harvesting of the trees is not an easy one. The profusion of mosquitoes and horse flies makes the work difficult. Many of the workers wear mosquito netting over their heads and faces.

It takes about 10 to 15 square meters of wood to provide two tons of needles to fill the 2000-liter still. The rate of condensed steam is about one liter per minute or about 300 to 360 liters for the five to six-hour distillation time. The yield of fir needle oil is about 35 to 40 liters for each charge of chopped fir needles. Typically, the first two and one-half

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Typical stand of fir trees

Chopper, plotter and pot still

Wood-fired steam boiler and coil condenser housed in cold-stream-fed water tank

Receiver for condenser steam and essential oil

Storage tanks for essential oil

Table 1. Analytical results gathered by Kazakhstan State Laboratory, Ust-Kamenogorsk, from a sample of fir needle oil from the June, 1999 production period

Specific gravity (20°)	0.899
Refractive index (20°)	1.470
Acid value	0.29
Ester value (as Bornyl Acetate %)	37.

or three liters (head cut) of each 35 to 40 liter total is separated from the main body of oil as a separate fraction and not included in the essential oil for trade sale.

Conclusion

The analytical values presented in Table 1 are within limits for Siberian fir needle oil, including the odor quality by blotter sniff test.

References

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