

Natural aromatic raw materials in the 80s

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Some perfumers seem to be concerned with the future of natural essential oils and with the decision they face, of including or not including any more naturals in their formulas. They are considering possible problems of availability, and the high prices for some materials that they think they cannot afford.

On the other hand, everyone knows that naturals bring to a formula something that no chemical does, that naturals round chemicals, and that naturals can be used in such small percentages, due to their strength, that the cost of the concentrate does not matter too much.

As you all know better than I do, naturals and chemicals are a marriage of convenience. The purpose of this presentation is to give evidence that shows that naturals will be available and usable in the 80s at a price/quality ratio that will help greatly in the creation of formulas and concentrates. Evidence also that the price of the naturals will tend to match the gap of the chemicals, as they often did during the past two or three years. This will be even more likely with the oil price problem and its influence on petrochemistry.

To return to this marriage of convenience: What steps have been taken in the 70s, to back up the above statements? The steps have included:

1. Diversification of production sites of natural essential oils
2. Development of processes for better production efficiency, either on the agricultural or on the industrial side; new techniques of extraction
3. Diversification of natural essential oils
4. Control of prices

Diversification of production sites

As you all know, scents were used thousands of years ago in the Far and Middle East for religious and sexual reasons. In Egypt, for example, we have evidence that some 3,000 years B.C. rather sophisticated perfumes were used. We have precise recipes based on mixtures of extracts or infusion of aromatic plants. Quite a number of European egyptologists, since the time of Champollion, have translated formulas of concentrates from hieroglyphs into modern languages through the ancient Greek. References to these perfumes are

numerous in many Egyptian temples (see photo). Perfumes arrived in Europe in the Middle Ages. The Christian crusades also brought spices and perfumes into Italy (Venice) and Western Europe.

But we have had to wait for the 19th century to move from the 100% "skilled" way of making natural essential oils to the semiindustrial and later the industrial approach. There is no doubt that the people of Grasse,

France, have been the pioneers in this change. Three aspects of the know-how developed at Grasse over the years have gained worldwide recognition. These include:

Agricultural production. Due to their microclimate, these people have had experience in the production of a wide variety of aromatic plants.

Processing. Though processes have evolved considerably over the years, the human touch in producing natural essential oils is still very important. You need to be a good "cook" to adapt the technique to the product you process; the processes could vary according to climatic conditions. This "Grassois" know-how is unique in an industry. It may be because these people have, from birth, an understanding of scents and flowers, and a respect for what they call "la fleur." I was impressed, when I first met workers and foremen at CAL in 1975, by the way they consider the flowers. There is no question of unions when the flower is there, everyone is on the desk overtime. It is a sort of priesthood. They are fully conscious of the art of producing good natural essential oils and of the art of perfumery.

Industrialization and modernization of techniques. The engineering companies in Grasse are number one in the world of any country with local natural essential oils.

The Grasse area is unique as far as climatology is concerned in Western Europe. Almost any aromatic plant used today for extracts in the fragrance industry can be produced in this part of the world. Most of them actually have been. Some of them still are, thanks to a microclimate that ranges from continental to subtropical. The Grasse essential oil industry processes agricultural material from: mimosa, thyme, violet leaves, broom, rose, carnation, jasmin, lavender, lavandin, (by solvent extraction) cyste, lentisque—one cannot name them all. Our raw materials are brought either from France (black currant buds, narcissus, mosses) or from elsewhere (mosses, immortelle, gums such as galbanum, olibanum, elemi) from the Middle East or even from Latin America and the Far East.

After World War II, and especially from 1960 on, with increased purchasing power, labor costs, and land costs, some aromatic plants became unprofitable crops in this area and in the industrial countries. Then came the diversification of sites.

Our industry went to other countries. Starting with Italy (do not forget that most of the Grassois are of Italian origin). Mr. Camilli, former owner of the CAL Company was the first to start production of aromatic plants in Italy (jasmin, camomile, iris, broom, lemon, bergamot). Then they went to French-speaking North Africa: Algeria (now practically out of production except for some kilos of jasmin concrete); Tunisia (production concentrated on products from bitter orange tree, neroli essence, orange concrete, petitgrain essence, eau de brouts, eau de fleurs d'orange, rosemary and essences for flavors); Morocco (jasmin, rose concrete and essence, neroli and more). At the same time, aromatic plant production was developed in South-

eastern Europe: (Yugoslavia, Bulgaria) and in Turkey (mosses, rose, spices, lavender).

This Mediterranean venture finally arrived at the most important place: Egypt. By the late 60s we were back to the source of perfumes. In addition to North Africa, aromatic plant production has been developed in West Africa (Ivory Coast for hesperides). South Africa (tagete, eucalyptus, jasmin, celery, marigold) and now Kenya (carnation, celery, geranium, tagete).

In Latin America the aromatic plant industry has been especially well developed in Brazil (bois de rose, mint, vetiver, eucalyptus, tonka bean, hesperides) and Mexico. In Asia, Indonesian production is already known for vetiver, sandalwood, patchouli, and spices (pepper, nutmeg, cinnamon, clove) but starting from sandal, India is now in the process of diversifying its production of natural oils. This market is very important for many flowers used "as is" and they want to take the surplus for manufacturing natural oils. Last but not least is China, where the Canton Fair is known for cheap oils. However, the Chinese wish to diversify production.

Some of these countries with plans for diversification of production should be countries of choice. A major point for the 80s is to have major items available from a number of locations. This diversification of sites and competition is definitely an important factor in keeping prices at reasonable levels.

Of course, it should be noted that getting good qualities of natural essential oils from a new site takes time. But it has already been achieved in some countries. It is also a fact that diversification of sites of production causes a problem for perfumers, as essential oils have different notes according to different origins. But you have already faced this difficulty over the past few years and you have even succeeded in getting the best of each oil to provide "round" notes and give a special appeal to your creations.

Let us focus on the first country of choice, Egypt.

Natural oils are produced in two main areas of Egypt today: the Nile delta and the Oasis of Beni Souef and Fayoum. It is quite likely that with the financial help they now get, the Egyptians will in the near future fertilize a larger part of their desert. As far as our industry is concerned, the closeness of Cairo to us makes it quite easy and cheap to go there frequently, and be able to develop new natural products as well as to control engineering, processing, and the quality of flowers and/or leaves.

Egypt is an example of what should be done elsewhere in the 80s, starting with jasmin and geranium. This country is now not only number one in the world for these two products, but has diversified its production of natural essential oils and will produce violet leaves, basil, carnation concrete, petitgrain essence, and to a lesser extent, rose concrete. Grasse technicians have helped the Egyptian producers a lot.

CAL/Pfizer, in accordance with its agreement with Machaly, gives agricultural, engineering, and processing assistance. We also control the quality of the production and agricultural raw material processed. In

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addition to these products (Machaly has 50 acres planted with jasmin and has the same amount of land contracted with farmers), we test three to four different new plants each year. Last year, we had success with marigold, nasturtium, but we failed with jonquil. This year we are trying lanyana, celery leaves, parsley leaves, and cosmos.

Entrance to the CAL plant in Egypt (above); jasmin field (top right) and a nasturtium field (bottom right).

I think Egypt is an example of what will be done elsewhere in the 80s. Egypt will continue as a major producer of natural oils, but will also be a "bellwether" country for testing and diversifying the production of natural oils.

The second country of choice is Kenya. Due to its location on the equator and its range of altitudes from sea level at Mombasa to 20,000 feet at Kilimanjaro, through plateaus (Nairobi is 4,500 feet high and so are the neighborhoods of Naivasha and Nakuru lakes), Kenya enjoys many different climates from tropical to subtropical, and the possibility of more than one crop a year.

Known for its geranium, Kenya is now developing the production of other oils with our help. These include carnation, celery leaves, parsley leaves, and vetiver. In addition to these aromatic plants, adapted from elsewhere, Kenya offers a magnificent flora, which will be tested.

India is also diversifying and has since 1978 already produced some good oils (jasmin, tuberose, vetiver) in addition to the sandalwood essence we have known for years.

From these examples you can see that the natural oil industry is moving very quickly to diversify sites of production and broaden the variety of oils produced in new sites.

Development of natural essential oil processing

Good work has been done by the industry in this respect. Changes in the production of natural oils began in the middle of the nineteenth century, when passing from open fire distillation to steam distillation with boilers using coal. Then came the first publication by Nandin using sulfuric ester to extract aromatic substances from aromatic plants. This work was adapted to the industry by Robiquet at the end of the nineteenth and the beginning of the twentieth centuries, by using so-called light essences from petroleum. But then the loss was too important and development work was done to obtain solvents with high boiling temperatures. The first one was benzol with an 80°C boiling point, and hexane with a 67-70°C boiling point.

What will the changes be for the 80s? *Mechanization of production.* Starting from an artisan type of production, largely labor intensive, the natural raw materials industry has developed a program of investment in mechanization and automation while still keeping the human input to conduct processing according to the quality of the raw material received.

The investment program (developed with the help of the Grasse Engineering Co.) includes vessels with increased capacity, and automatic loading and unloading. New equipment has also been installed for the transformation of concrete into absolutes. Instead of

paper filters, floating filters, vacuum filters, rotative filters, or back-current filters are now used. In other words, we are implementing, or better, adapting the techniques used in the fine chemical industry and/or in the large volume flavor industry. For instance, the filters we are using are the same but much smaller than those used for the extraction of products (antibiotics or fine chemicals) obtained by fermentation.

Development of new processes. We aim to avoid problems with the normal product. The color of some products may be an inconvenience. We have developed molecular distillation, which gives colorless products and some with a different note (violet leaves absolute vs/violet leaves UV which has a much more floral note) and sometimes stronger, as with absolute Cyste UV. A full line of the UV (for ultra vacuum) products is now available.

New equipment for processing concretes into absolutes (left); rotative filter at CAL/Pfizer, Grasse (above) and a molecular distillation unit (below).

Development of new solvents. The process of extraction by benzol now poses legal problems. Companies are studying solvents that give products of similar quality and equivalent yields to those obtained with the benzol process. We also want to make natural essential oils available at cheaper prices. With a new solvent we have been able to obtain, for instance, a jasmin absolute 50% cheaper than the ordinary jasmin hexane absolute. This is jasmin CAMR. Of course this 100% natural product has a different note but it is strong, has a good jasmin note, and is completely benzol free.

This process is applicable to other expensive natural raw materials and we hope in one or two years to have a complete range so that all these products could be used in perfumery, even for middle range price creations.

Diversification of natural essential oils

Gunther said that we are infants in using the possibilities of the flora, especially in the countries where we are producing now. So far we have revived and tested aromatic plants in these countries. But anyone knows that Africa and Asia are the native homes of

thousands of species, some of them having been used for centuries by local residents. We have already tested some and in the very near future we are going to systematically test a good number of them. As far as we are concerned, Kenya will be our starting point, followed by Asia. We definitely believe that this screening is very important, as it should enable us to make available to perfumers new natural notes which will "round" chemicals and diversify the perfumer's creative palette. Of course these products will be tested in safety evaluation laboratories such as the one our company has in Amboise, France.

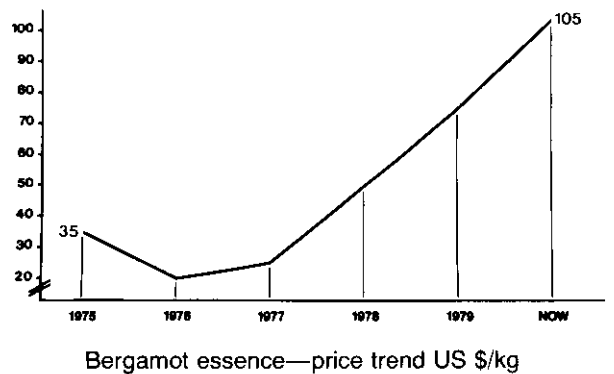
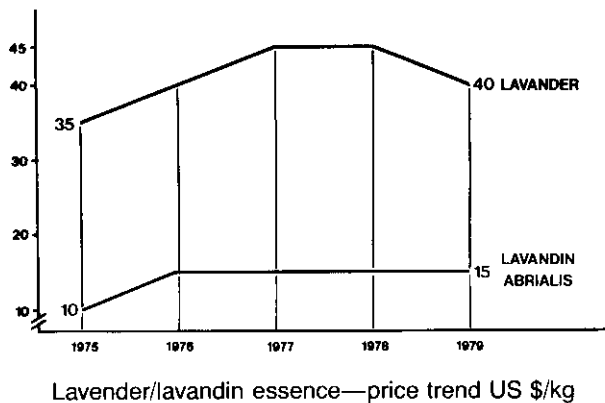
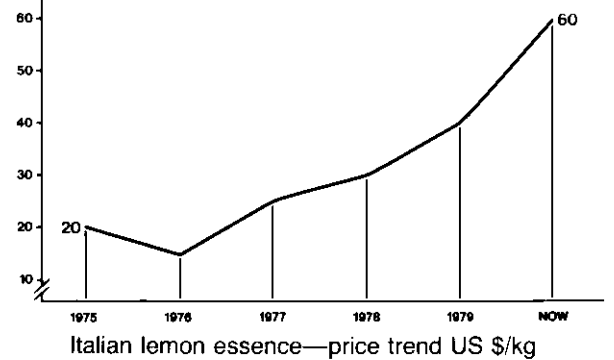
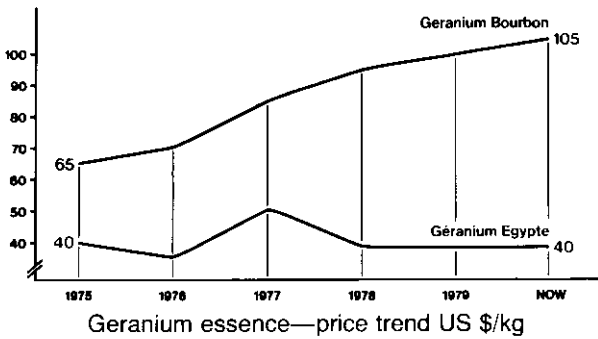
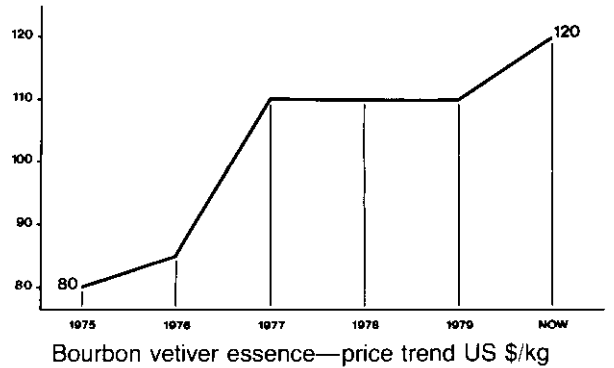
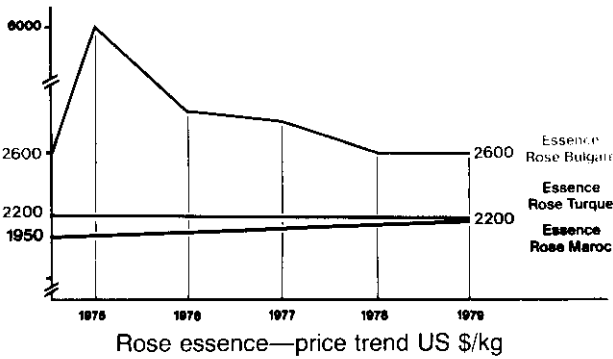
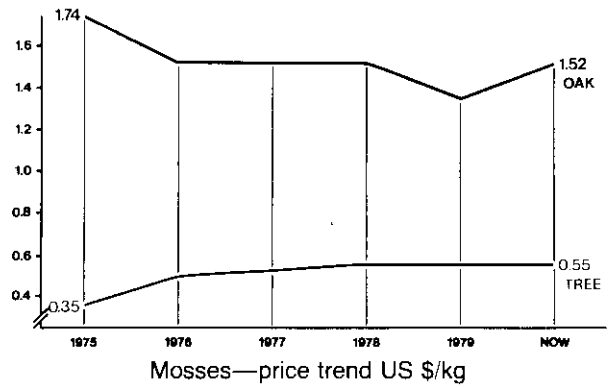
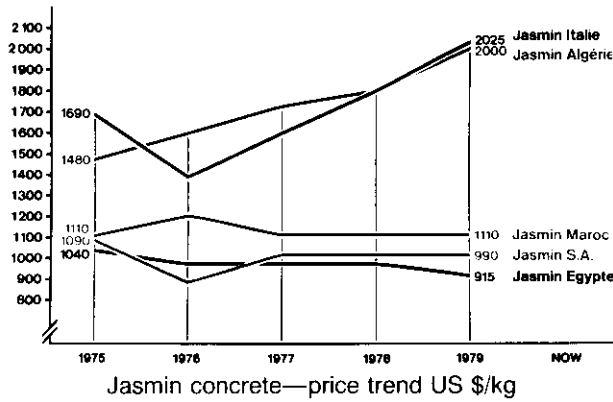
Control of prices

So far we have seen that the necessary steps have been taken to secure sources of supply of naturals. But what about the prices? As you know, prices for natural range from \$4.00 per kg to \$25,000 for 100% pure natural irone. There is a wide range of prices in chemicals also, although not as wide. We have studied the prices of 10 natural essential oils (jasmin, rose, geranium, lavender and lavandin, mosses, vetiver, sandalwood, patchouli, lemon, and bergamot) (see

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graphs). The conclusion to be drawn from this study is that whenever an oil is produced in quantity in more than two countries, the prices over the past four years have been stable or have increased a maximum of 10%, and we can expect an average increase in these prices which will be no more than 10% for the next year.

In contrast, for products or qualities which are typical of one country, climatic conditions plus speculation have caused price increases well above 10%; these products include bergamot, Italian lemon, and patchouli. The same phenomenon appears with the chemicals, with of course a big increase for petrochemicals.



There have been noticeable increases in benzyl acetate, aldehyde C10, C11, C12, and not so noticeable increases in methyl ionone, must, xylene, and so forth. But in general, if the average price per kg of chemicals is far less than for naturals, the increases to be expected in the early 1980s are much greater.

Major Synthetic Products - Price Trend U.S. \$/KG

	1976	1977	1978	1979	1980
Benzyl acetate	2	2		3	3
Phenyl ethyl alcohol	6	6	6	5	6
Aldehyde C.9	38				38
Aldehyde C.10	15	16		15	17
Aldehyde C.11 undecylenic	37		54	54	55
Aldehyde C.12 MNA	42	44	63	47	50
Hexyl cinnamic aldehyde	7				7
Alpha-amyl cinnamic aldehyde	5	5	5	5	6
Coumarin	11	12	13	14	17
Methyl dihydro pasononate	109		102	112	
Ionone 100%	15	16			20
Gamma-methyl ionone	19		26	27	28
Benzyl salicylate	5	5	5	5	7
Musk xylene	6	6	6	7	7

To sum up, the natural essential oils market should be regulated. If we have demonstrated that quite a few of the naturals have not increased much more than chemicals, we should monitor this price trend in the 80s. In chemicals the petrochemistry products are the problem. In naturals, climatic conditions and, as a consequence, speculations are the problem. To avoid these problems, we should:

Diversify the sites of production as we have already begun to do. It is thanks to free competition between Morocco, Egypt, and now India that the price of jasm-in has not increased. The same is true for rose, lavender, and mosses. For all the major items more than two countries of production should be contemplated.

Encourage teamwork among the users of natural essential oils, perfumers, buyers, and producers, to conduct market surveys and produce what is required. In other words, be more professional than the industry is in many countries, where the agricultural market does not produce what is needed but what is profitable.

Let me quote remarks made by Givaudan's Purchase Director at Bangalore in 1979: "Information must be exchanged continuously. Producers as well as traders and users have to cooperate in order to set up and promote the development of a regular and more healthy trade."

With this approach, there is no doubt that we will achieve our goal, which is to have steady prices with a maximum increase, if any, no greater than the cost of living, to avoid the ups and downs of the erratic prices we faced in the early 70s.

I hope I have shown enough evidence to make you sure that in the 80s natural essential oils will play an important role in the marriage of convenience with aromatic chemicals in the perfumery industry, and that they will be available at prices monitored so that you will feel happy and secure in using them.

Maurice Maurin is creative perfumer of Creations Aromatique, Nice, France. He joins us in attempting to forecast the future for creative perfumery. Maurice Maurin is observing his 25th year in the industry, having begun his creative interests at Charabot and later with Givaudan in Paris and New York.