Narcissus poeticus

The Heart Note

Olfactive aspects, chemical composition, extraction, economics and ethnobotany



Narcissus poeticus var. poeticus.

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The intensely fragrant *Narcissus poeticus* or poet's narcissus has been highly prized in perfumery since the early 20th century. Until the late 1960s, one of the principal zones of harvest (cited by Guenther) of these wild blooms was the Haut Var region of Provence, where the author currently lives. This article brings together botany, history, personal accounts of hand-harvesting, folklore and medicinal uses of this remarkable plant. It also describes current transformation processes for the production of narcissus concrete and absolute, chemical composition as well as fragrance uses.

Narcissus poeticus is thought to originate from the Middle East or Eastern Mediterranean, but it is now naturalized all over Europe, particularly France, Spain, southern Italy and northwestern Greece (see "Botany of *Narcissus*"). Within France, its geographical distribution is predominantly central and eastern and includes the Massif central, the Alpes, the Pyrenees, the Gard (Vauvert), Cevennes, Auvergne (Haute-Loire and Lozère). Within Provence, *N. poeticus* has a mountain distribution throughout the Haut Var (canton de Comps-sur-Artuby, Aups), the Alpes de Haute Provence (La Palud sur Verdon, Moustiers-Sainte-Marie, Riez) and the Alpes Maritimes (the Caussols plateau, Seranon, Andon).

Vulnerable Status

Narcissus poeticus is a protected species in both the Champagne-Ardennes region and Bourgogne. This is mainly to limit picking and overexploitation. Other Narcissus species are protected or classed as vulnerable within France. They include Narcissus triandrus L ssp. capax (Salisb.). Three species are on the European endangered listing: Narcissus pseudonarcissus L. ssp. nevadensis, N. scaberulus and N. tortifolius.

Narcissus poeticus is a protected species within Austria and in Italy; three regions afford it absolute protection: Friuli-Venezia region (since 1972), Province of Bolzano (since 1973) and the Lazio region (since 1974).

An observation in the Haut Var as well as in countries such as Switzerland,

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Narcissus poeticus: aromatherapy and medicinal uses, and myth, magic and folklore.

I (narcissus) am the ideal, I am the dream that warms the heart and makes green the buds of the soul. The person who picks me gathers joyful days made sunny by my flame.

Jean-Henri Fabre (1823-1915)

is that wild stands of *Narcissus poeticus* are increasingly in regression. In the Haut Var, whole colonies have disappeared in some zones, while in others the numbers are significantly lower than 40 years previously. There is no single factor identified as a causative agent, though some of the factors listed by the European Committee for the Conservation of Nature and Natural Resources may be illuminating. A number of these factors have been echoed by the Association Narcisses Riviera (www.narcisses.ch), an association for the protection and promotion of *N. poeticus* of the Swiss Riviera. They include:

- Changes in land drainage, lower water table
- Regeneration of scrubland by lack of grazing
- Low populations means less genetic diversity

Narcissus varieties, appearance and essential oil

Amaryllidaceae is a family of approximately 1100 species belonging to 85 genera of which one is Narcissus. This genus has 10-13 sections, is subject to frequent revisions and reassessment, and is represented by approximately 50 species of bulbous perennial herbs. Narcissus is cultivated widely throughout the world. Numerous hybrids occur as well as artificial hybridization, thought to be started by English gardeners in the 19th century, yielding many cultivars. Each species has a large variability. The Royal Horticultural Society (RHS) has been pioneering the classification of Narcissus since 1908, and since 1955 the RHS has been the International Registration Authority for this genus.

Not all *Narcissus* species are fragrant, the principle ones being:

- Narcissus poeticus Linn. (narcisse des montagnes)
- Narcissus tazetta de Candolle Linn. (narcisse des plaines)
- Narcissus jonguilla de Candolle (jonguil)

Under the section of Narcissus poeticus, there are six varieties: poeticus, hellenicus, majalis, physaloides, recurvus and verbanensis.

Variety poeticus: In the French Haut Var region of Provence, Narcissus poeticus grows at an altitude of about 1000 m. (In Provence, there are six vernacular names by which *N. poeticus* is commonly known: narcisse, la dono, la flodono, courbodono, belori and jusiouvo. In the Haut Var, the name most commonly used is 'la dono' (or 'lady' in Provencal.) Elsewhere, the plant's distribution may be found at an altitude between 300 and 2300 m.

Narcissus poeticus is a geophytic perennial plant approximately 30-70 cm high, with three to five long, flat, swordshaped gray-green leaves that are often slightly twisted. The entire plant's aspect somewhat resembles young leek plants, hence a common name, 'porillon' (young leek). The blooms are highly fragrant and usually solitary (one bloom per scape). The perianth is pure white with six oblong tepals with a shallow, wide cup-shaped yellow-orange corona fringed with red. The perianth is often backswept in wild plants. The scape is slightly flattened and has two ridges There is a papery spathe below the flower. The fruits are capsular and oblong, divided into three compartments containing numerous black seeds.

The plant often grows in large colonies in humid zones such as damp mountain meadows and alongside streams and rivers, predominantly in calcareous soils in full sunlight to partial shade. It is tolerant of ground freezing during winter, and the above ground parts are fairly resistant to frost. Pollination is thought to be by butterflies and moths. Colonization is by offsetting and self seeding. Narcissus poeticus blooms between April and June depending on its location. Within the Haut Var, the principal blooming time is mid-to-late May.

Essential oil: The essential oil is produced in the corona, with all cells participating in production — there is no storage of the fragrant compounds. Instead, functioning like an osmophore, the compounds diffuse across the cells and are released into the air. This is similar to jasmine, rose and ylang ylang. However, unlike jasmine, the cells stop producing volatile compounds once picked; thus, *Narcissus* was never extracted by enfleurage techniques.

- The use of fertilizers, pesticides and herbicides
- Changes in land use, urbanization
- Ploughing of old grasslands
- Changes in arable farming
- The influence of forestry
- · Lack of pollinators
- Overgrazing
- Pollution
- Disease

In speaking with inhabitants of the Haut Var, local reasons suggested for the regression of N. poeticus include the following:

- The climate is now drier than it used to be; as narcissus is a plant of humid zones it is thus sensitive to increasing droughts
- Some zones in our area have been drained by digging drainage ditches

- Cutting for hay now occurs up to two weeks earlier than previously
- Fertilisers and herbicides; as *N. poeticus* is considered a hay spoiler (due to its

Narcissus harvest at Trigance, Haut Var, 1951.





inedibility), an old technique to suppress its growth was to add large amounts of manure

- Overgrazing is a common feature of grasslands now that animals are enclosed by fencing instead of being free to wander
- Due to larger concentrations of animals in the meadows, the ground is compacted to a degree that is negative for the plants' proliferation

In the Swiss Riviera, an increase in plant numbers has been observed in some areas where steps have been taken to protect and promote *N. poeticus*. Some measures include modification of agricultural practices, including delayed cutting of hay, raking by hand to

Narcissus harvest at La Martre, Haut Var, 1955. Photo courtesy of Mme Richard

Narcissus poeticus var. poeticus.

Safety

Clinical and anecdotal evidence

All members of the Amaryllidaceae family are moderately toxic, particularly the bulb, which contains significant quantities of phenanthridine alkaloids such as lycorine and galanthamine. Ingestion of the bulb can cause severe digestive disturbances such as diarrhea and vomiting, with central nervous system effects such as trembling and convulsions. Paralysis and death following consumption has also been reported following ingestion of large quantities. Not surprisingly, eating the flowers has been reported to be particularly toxic to children. Contact with all parts of the plant can cause skin irritation; the bulb is particularly irritating due to the presence of both alkaloids and raphides of calcium oxalate. The leaves and bulb are also toxic to grazing animals. In the Haut Var, it is noted that hay containing narcissus leaves is often sorted by the animals who avoid the narcissus in preference to the other herbs.

Narcissus poeticus in particularly is considered quite irritating (bulb, leaves) and emetic (bulb). Allergic contact dermatitis has also been reported. The flowers may also contain a sensitizing agent. These observations are largely obtained from cases reported from persons working within the narcissus bulb and cut flower industries. Pickers of the blooms are therefore exposed to a degree of risk; Schwartz reported that an estimated 20 percent of pickers were affected by hand and forearm dermatitis reactions ('lily rash'), with other exposed body parts affected if picking took place in warm conditions.³

With regard to *Narcissus* absolute, Opdyke reported slight irritation in mice and swine under 24 h occlusion, but in humans at 2 percent concentration in petrolatum, it was found to be non-irritant and non-sensitising in a 48 h closed patch test.⁴ Kozuka et al. reported on a collaborative study of the allergenicity of fragrance materials, testing 11 substances of which one was *Narcissus* absolute.⁵ The authors found no sensitising potential in animal studies, but found a small number of positive reactions with patch testing in humans. Despite this, the authors concluded that daily use through skin application could still be regarded as relatively safe.

However, more recently *Narcissus* absolute has been identified as a potential primary sensitizer, and comprises part of the 'New Fragrance Mix' (for allergy testing) along with aromatic products such as lemongrass oil, jasmine absolute, ylang ylang essential oil and sandalwood essential oil.

Additionally, the aroma of both the flower and the absolute can cause nausea and vomiting in some persons. This is similar to reactions seen with ylang ylang and jasmine blooms and extracts and may be due to similarities in their chemical composition.

Despite the potential dermal irritation that can be experienced during picking, only one picker spoken to while researching this article recollects this as being a practical problem — she suffered dermatitis on her hands each season. Other workers recall being told that the sap of the narcissus was toxic and that hands should be washed if the sap made contact with them.

In speaking with those who have harvested narcissi in the Haut Var, all agree to the aroma of the flower being strong, overpowering and soporific, leading to a sensation of heaviness. One person stated that "if you fell asleep in the barn where the narcissus blooms were being stored, you might never wake up." When asked if narcissi blooms were kept in the house, the general response was yes, if the room was airy, but in enclosed spaces the overpowering fragrance would dominate the home. Flowers were never placed in bedrooms due to their anecdotally 'toxic' effects. For some, headaches and nausea were described when working with the flowers in close proximity.

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avoid compaction and damage by heavy machinery, and clearing areas of invading trees and shrubs. Additionally, there is a financial incentive to landowners to protect zones where *Narcissus* proliferates.

Harvest: Then and Now

From the early 20th century until the late 1960s, *N. poeticus* was harvested in various areas of the Haut Var. The study presented here is focused on the commune inhabitants of Canton of Comps sur Artuby.

In this region, all harvesting was conducted by hand over an approximate 10-day to twoweek flowering period in May. No tools were

Narcissi, the fairest among them all, who gaze on their eyes in the streams recess till they die of their own dear loveliness.

Percy Bysshe Shelley (1792-1822)

ever used for harvesting. If the mistral was blowing at the time of flowering, the flowers dried more quickly and the harvest period was shortened. Only fully open blooms were picked, leaving buds and overblown flowers behind on the plant. Pickers placed the blooms into jute sacks/

Narcissus poeticus var. poeticus.

aprons passed around the waist; when the picker bent over, the forward flap



Breathe the fragrance of narcissus, not necessarily once a day, once a week, once a month or once a year, but do not miss it at least once in your lifetime. Because in truth, it is in the heart of man that we find the roots of madness ... The perfume of narcissus has the power to restore them all.

Prophet Mohamed

opened to permit the sack to be filled with blooms. The locals remember that it was possible to pick several blooms at once with each upturned hand and that the bloom was severed generally below the spathe. There was a friendly rivalry amongst the pickers and each person brought a picnic that was eaten in the field. Generally, each family, with the help of neighbors, harvested from their own land, selling to a local person either from their own or a nearby village that stocked the flowers for sale to courtiers from Grasse. In some instances, the buyer organized for groups of persons to go to selected areas to pick. Payment was made to the pickers per kilo of blooms at the end of the day.

Care of harvested flowers: Of great importance was the freshness of the blooms; it was imperative that they be kept cool, not too compacted and unblemished. Under the wrong conditions, the flowers quickly wilted and fermented. In some cases, the collection of flowers by the courtiers was every two days, thus requiring careful storage, spread out on linen sheets until they arrived. It has been said that some persons lightly watered the flowers to keep them fresh (this of course added a little to the weight of the blooms). The flowers were also turned regularly to keep them aerated until the courtiers arrived and the flowers were transported to Grasse.

Yields: On a good day of picking, according to Guenther, the weight of blooms might amount to a maximum of 3.2 kilos per person if the person picked for 8 h.^{1,2} However, our study reveals that the quantity of flowers picked in the Haut Var was much greater. Described as "back-breaking" work, quoted harvest weights ranged from 15 to 30 k per person per day. The work was difficult, requiring the person to stoop



Venus with golden hair only sleeps on a bed of narcissi.

Claudien (370-400 AD)

for long hours to pick blooms.

The average concrete yields were 0.2-0.26 percent, with the concrete yielding 27-32 percent alcohol-soluble absolute.^{1,2} Thus, if a picker harvested 30 kilos of flowers, this would yield approximately 60 g of concrete and 18 g of absolute when extracted.

In the late 1950s, Steven Arctander estimated that less than 100 kilos of *Narcissus* absolute were produced annually. This included *Narcissus* absolute obtained from *Narcissus tazetta*.

Modern harvesting: Today, commercial harvesting takes place in areas such as the Lozère. Laboratoire Monique-Remy (LMR) is a major producer (more than 50 percent of the world market) of *Narcissus* concrete and absolute, with an extraction facility in this region. Harvesting is now semi-mechanized, using a hand-pushed cutter, balanced on old bicycle wheels, as well as a toothed rake that is swung by hand, catching up the blooms. Both methods yield far greater quantities than hand picking, in the region of up to 300 k per day, and are much less labor intensive. With these methods, invariably a degree of leaves and stems are present in the charge, whereas picking by hand gave a much cleaner harvest.

Annually, Laboratoire Monique-Remy processes between 180 and 250 tonnes of flowers, with yields (using hexane extraction) being similar to the days of Guenther; 450 kilos of flowers yielding 1 kilo (0.22 percent) of concrete and 350 g of absolute (35 percent). There are numerous advantages to having the processing facility on site where the narcissi are harvested, though in some cases the blooms are picked in the Lozère and transported by truck to Grasse for extraction. This often results in extraction of wilted and fermenting flowers, affecting the quality of the end product.

Economics

In the Haut Var, the revenue obtained from harvesting wild narcissi was for some an important complement to existing resources rather than a principal income. Pickers received about 1 franc per kilo of blooms (today's rate is in the region of 13 francs per kilo). With a reduction in population, changes in agricultural practices and the regression of narcissi, the harvest of narcissi for commercial purposes ended for the most part in the mid 1960s, although in some areas harvesting continued into the 1970s. Narcissus absolute remains a precious material for the perfumery industry; today's prices reflect this with 28 g (1 oz) of absolute costing as much as \$1100.

Extraction

According to Guenther, *Narcissus* absolute may be obtained from either *N. poeticus* or *N. tazetta*.^{1,2} *Narcissus jonquilla* is separately extracted and sold as jonquil absolute. *Narcissus tazetta*, also known as 'narcisse des plaines,' was cultivated for the

perfume industry around Grasse, and yields an orange absolute with a sweet floral character. It was considered less powerful than wild *N. poeticus*, the 'narcisse des montagnes' harvested at higher altitudes. This species yields a green-brown absolute that has a more powerful and tenacious fragrance, and is more highly prized.

Originally, the method of extraction for narcissus

Harvesting equipment in the Lozére.

Solvent extraction of Narcissus poeticus.



was by hot fat maceration.^{1,2} This cumbersome technique required up to 10 macerations of fresh blooms in the same batch of fat (a mixture of tallow and lard) until it became saturated with fragrance and called 'pomade de narcisse.' The pomade was sold as such or treated further by washing with alcohol to obtain an alcoholic 'extrait de narcisse.' Some difficulties of this process included the risk of rancidity and the presence of an additional fatty bynote that modified the olfactory character of the original flower. This method was soon replaced by volatile solvent extraction (such as hexane) of the fresh blooms; this remains the principal technique for the production of narcissus concrete and narcissus absolute.

An analysis of *Narcissus* absolute provided by Laboratoire Monique-Remy indicates the following gas chromatography-derived percentage composition (Auvergne):

cis-3-hexenyl acetate	0.98
hexyl acetate	0.25
1,8-cineole	0.76
limonene	0.10

cis-ocimene	0.52
o-cresol	< 0.01
trans-ocimene	1.51
p-cresol	0.03
guaiacol	0.22
methyl benzoate	0.14
nonanal	0.40
linalol	0.26
benzyl acetate	0.31
α-terpineol	4.25
3,4-dimethoxytoluene	0.58
coumarin	0.18
β-caryophyllene	0.67
trans-methyl isoeugenol	1.40
methyl undecyl ketone	0.24
trans-nerolidol	0.60
dillapiole	0.44
methyl jasmonate	0.15
benzyl benzoate	6.60
phenylethyl benzoate	0.31
benzyl salicylate	0.40
palmitic acid	3.36
cinnamyl <i>cis</i> -benzoate	0.48
ethyl hexadecanoate	1.64
octadecanal	0.60
cinnamyl trans-benzoate	1.25
methyl linoleate	0.95
methyl linolenate	1.27
linoleic acid	12.80
linolenic acid	6.46
ethyl oleate	7.40

ethyl octadecanoate	2.75
isoamyl hexadecanoate	1.03
2-methylbutyl hexadecanoate	1.12
tricosene	0.65
methyl nonadecyl ketone	0.49
methyl eicosanoate	0.56
ethyl eicosanoate	0.82
pentacosene	4.80
benzyl hexadecanoate	0.80

Fragrance and Perfumery Uses

Narcissus enters into compositions such as high grade French-style perfumes, providing exquisite, strong and heavy tonalities, and entering mostly as a middle or heart note. In the early 20th century, narcissus was much in vogue in the perfumery world, playing a role in such compositions as "Narcisse Noir" and "Narcisse Blanc" (Maison Caron). Narcissus' fashion declined and then returned, beginning in the 1970s, entering into compositions such as "Chanel 19" (Chanel), "First" (Givaudan), "Silences de Jacomo" (Givenchy), "Or Noir" (Pascal Morabito), "Narcisse et Fleur de Narcisse" (Chloe), "Balestra," "Halston Night" and "Samsara."

In applications the material's aroma is described by various sources as:

- Strong foliage green
- Very sweet herbaceous
- Hay-like
- Good tenacity
- Violet leaf-like
- Green earthy
- Warm, animal-like
- Sweet jasmine-hyacinth
- Castoreum
- Faint, persistent floral undertone

With its green, spicy, warm and sensual accords, narcissus blends well with many of the floral absolutes, including clove bud, carnation, jasmine, neroli, ylang ylang, rose, mimosa as well as karo-karoundé and mate.

Conclusion

This fragrant bloom has captivated, inspired and enchanted people worldwide for many years both in terms of its fragrance and its vulnerable beauty as well as being a potential source of income. In our region of the Haut Var an annual narcissus festival (to be held May 21-22) serves to raise awareness concerning the fragility of our mountain ecosystem, symbolize respect for old traditions and engender support for mountain economies.

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References and Bibliography

- E. Guenther, *The Essential Oils Volume I History*origin in plants, production- analysis. pp 188-201, R.E. Krieger Publishing Co., Florida (1948).
- E. Guenther, *The Essential Oils Volume V.* pp 348-352, R.E. Krieger Publishing Co., Florida (1952).
- 3. L. Schwartz et al. Occupational diseases of the skin. 3rd Edition. Henry Kimpton, London (1957).
- D.L.J. Opdyke, Monographs on fragrance raw materials. Narcissus absolute. Food and Cosmetics Toxicology, 16, 827 (1978).
- 5. Kozuka et al., Allergenicity of Fragrance Materials. Acta Dermatol., **3-4**, 326-335 (1996).
- 6. J. Addison, *The Illustrated Plant Lore*. Sidgwick and Jackson, London (1985).
- The New RHS Dictionary Manual of Bulbs. Edits., J. Bryan and M. Griffiths, Macmillan Press, London (1995).
- 8. D. Burnie, Wild Flowers of the Mediterranean. Dorling Kindersely, London (1995).
- 9. C.G. Wilson, Wild Flowers of Britain and Northwest Europe. Dorling Kindersely, London (1994).
- Council of Europe/Conseil de L'Europe List of Rare, Threatened and Endemic Plants in Europe. In: Nature and Environment Series No 27. (1982). European Committee for the conservation of Nature and Natural Resources Edition, Strasbourg (1983).
- H.E.M. Dobson et al., Interspecific variation in floral fragrances within the genus Narcissus (Amaryllidaceae). Biochem. Syst. Ecol., 25(8), 685-706 (1997).
- 11. A. Fedensieu, N. Moulin and J.-L. Domenge, Memoire et paysages du Verdon. Le bec en l'air, Manosque. Parc Natural Regional du Verdon (2002).
- P.J. Frosch et al., Further important sensitisers in patients sensitive to fragrances. Contact Dermatitis, 47(5), 279-287 (2002).
- G. Guy, Les Plantes a parfum et huiles essentielles a Grasse, Botanique-culture-chimie-production et marche. Editions L'Harmattan (1997).
- R. Madelenat, Les narcisses, en notes vagabondes. Votre Beaute. Mars, 88-90 (1994).
- 15. Narcisses Riviera Rapport d'activite 2002. www. narcisses.ch.
- 16. Parcs National des Ecrins, A la decouverte des fleurs des Alpes. Libris, Seyssinet-Pariset (2002).
- B. Press and B. Gibbons, Wild Flowers of Britain and Europe. New Holland Publishers, London (1993).
- P. Vigneron, http://perso.club-internet.fr/v_pascal/ amaryllidaceae