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THE FIRST TRULY INDEPENDENT WATCHDOG FOR THOSE WORKING WITH NATURAL AROMATIC MATERIALS

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Notes on Minor Oils - Santolina oil (*Santolina chamaecyparissus* L.).

v1.03 Mar 2010 (to be continuously expanded).

(N.B. Some material updated from monograph in *Natural Aromatic Materials – Odours & Origins* by Tony Burfield (2000) pub AIA Tampa).

***Santolina chamaecyparissus* L.**
syn. *S. incana* Lam.
(Fam. Asteraceae)
Santolina oil
Syn. Cotton lavender oil
EINECS-CAS No: 84961-58-0
EC No: 284-647-6
Labelling: Xn Hazardous
Risk & Safety Phrases: R10-43-52/53-65, S24-37-62
Declared hazardous components according to EFFA CoP 2009 Att VI:
2% camphor Xn; R20-68/22
2% limonene Xi; R38-43, N; R50/53

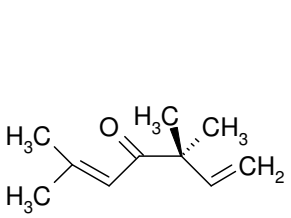
Distribution: *Santolina* is a genus containing approx. 10 species of aromatic shrubs. S. *chamaecyparissus* is a hardy aromatic, dwarf evergreen shrub native to the W. and Central Mediterranean area (growing wild for example in Spain, Tunisia & Morocco, and being naturalized in parts of Britain). It is often grown in gardens for its attractive wooly silver-grey leaves born on woody stems, and for its yellow flowers. Akerreta *et al.* (2007) note the wide availability of *S. chamaecyparissus* subsp. *squarrosa* ["manzanilla" (chamomile)] 'throughout the Mediterranean bioclimate and Temperate Oceanic of sub-Mediterranean variant...'

Preparation: Santolina essential oil is obtained by steam distillation of the flower heads / flowering aerial parts of *Santolina chamaecyparissus* L. Lawrence (1996) estimated world production at 300 tons/y.

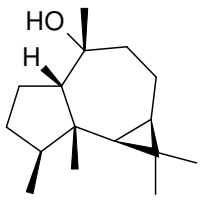
Description. Both leaves and flowers are aromatic; many observers prefer the odour of the crushed leaves. The commercial oil (of French origin) prepared via steam distilled of the flower heads is a yellow mobile liquid, described as being of a dry woody character, mingled with delicate lavandaceous notes and a bitter terpene top-note (gamma-terpinene like). This latter aspect has been described elsewhere as Cypress-like. The dry-out is predominantly soapy-herbaceous woody, with an unpleasant urinic edge, and sometimes a slight damascone-like fruity character.

Santolina oil Spain is often encountered as possessing an Intense, smoky, sage-like herbaceous character, with a hint of blackcurrant and a slight green-pea note. Dry-out is soapy, woody (Burfield 2000).

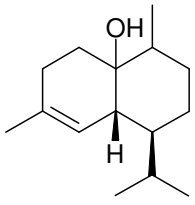
Chemistry. According to Giner *et al.* (1993), one of the principle components of the essential oil was found to be artemisia ketone (2.49%), as well as myrtenal (3.82%), camphor (4.67%) and three unknown sesquiterpene alcohols (collectively to 18.92%). Other researchers (e.g. Demirci *et al*. 2000) have found artemisia ketone (also known as santolinenone) to be the principle component at 38.1%. Yet other studies such as that of Villar *et al*. (1986) analysing the essential oil of of *S. chamaecyparissus* ssp. *squarrosa* from plants from Valencia show a different distribution of components – here with camphor at 25%, allo-aromadendrene 19%, p-cymene+1,8-cineole 10%, alpha-muurolene 7% with thujone at 0.2%. However, the examination of essential oils from several *S. chamaecyparissus* subspecies, both wild (Spanish insular & peninsular) and cultivated (Spanish & British), reveals a slightly more complex story (Pérez-Alonso & Velasco-Negueruela 1992). Analysed samples from cultivated plants characteristically showed a preponderance of artemisia ketone (27.8-35.6%) & T-cadinol (4.8 to 23.6%), whereas camphor (42.9%) and cubenol (17.3%) predominated in the insular plant derived oils. The essential oils of peninsular populations showed a predominance of monoterpenes in subspecies *incana* (85.9%) & *squarrosa* (45.2-68.5%), of which camphor (9.2-24.9%), borneol (11.6-28.4%) and 1,8-cineole (2.3-8.7%) were the major components. Sesquiterpenes (to 61.4%) mainly made up the composition of the subspecies *tomentosa* where elemol (5.0%), nerolidol + spathulenol (9.3%), copaenol (15.2%), ledol (4.1%) and cubenol (6.7%) were found to be the major components



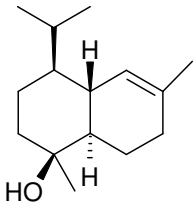
Artemisia ketone



ledol



cubenol



T-cadinol

Uses of Santolina oil. Buolos (1983) mentions that the plant is used in N. Africa as a remedy against intestinal worms and as a spasmolyticum, amongst other

uses. Akerreta *et al* (2007) maintain that the plant is commonly used as a 'chamomile' tea for digestive disorders in Navarra and other Mediterranean areas. Da Silva (2004) comments that the inflorescences of *S. chamaecyparissus* are widely used in Mediterranean folk medicine for their analgesis, anti-inflammatory, antiseptic, antispasmodic, bactericidal, fungicidal, digestive and vulnerary properties, and is used in phytotherapy for different kinds of dermatitis The essential oil has anti-candidadal properties (Suresh *et al.* 1997), and finds some limited uses in perfumery and cosmetics.

Safety of Santolina oil.

Prohibited IFRA (Standard last amended July 2008), due to the presence of structural alerts as defined in the Human Health Criteria Document (Ford *et al.,* 2000), or adverse data on the material itself and/or adverse data for a structurally related material (Ref: Ford *et al*. (2000) *Human Health Criteria Document*, *Reg. Tox & Pharm*., **31**, 166-181). We are not informed about which of these reasons for the prohibition might apply, but as we noted in *Cropwatch Newsletter* # 4, Santolina oil was added to an IFRA list of 'other ingredients with 'no-supported use' as witnessed in the 40th Amendment to IFRA (i.e. presumably translating as 'no one responded to our circular!'). But if this non-use by IFRA members really is the case, since Lawrence estimated Santolina oil production was 300 t/y in 1993, and our information is that production has increased since then, it would be interesting to find out which non-IFRA perfume companies are using it, and whether non-use by IFRA members is statistically meaningful in a wider regulatory context.

However, in spite of the above-described IFRA ban, there is currently little publicly available data on santolina oil toxicity, or the toxicity of its major component artemisia ketone (which also occurs in wormwood & lanyana essential oils) which Cropwatch can easily find. Published papers by Giner *et al.* (1986) & Giner *et al.* (2006) on the pharmacological properties of *S. chamaecyparissus* extracts do not appear to indicate any potential toxicological concerns, neither do any declared components in the IFRA-IOFI Labelling Manual 2009 (small quantities of limonene & camphor are listed) raise any grounds for the IFRA prohibition.

Furthermore, the wide range of essential oil compositions from different growing environments and from individual *S. chamaecyparissus* subspecies - as this monograph has clearly illustrated - makes blanket statements on santolina oil toxicity appear pretty precarious, without further qualification.

Bibliography.

Santolina oil: Composition.

Aboutabl E.A., Hammerschmidt F.J. & Elazzouny A.A. (1987) "The essential oil of *Santolina chamaecyparissus*" *Sci. Pharm*, 1987

Ahuja A., Bakshi S.K, Sharma S.K., Thappa R.K. , Agarwal S.G., Kichlu S.K. , Paul R., Kaul M.R. (2005) "Production of volatile terpenes by proliferating shoots

and micropropagated plants of *Santolina chamaecyparissus* L. (cotton lavender)" *Flavour and Fragrance Journal* **20**(4), 403 – 406. Abstract. The biosynthetic capacity of in vitro proliferating shoots and regenerated callus clones has been evaluated for essential oil production. On evaluation it was found that the essential oil isolated from foliage of proliferating shoots and regenerated plantlets was a complex mixture with 49 components, 25 of which were identified, corresponding to 80% of the total oil content. The analysis of the identified constituents included monoterpene hydrocarbon (43%), oxygenated monoterpene (31%), sesquiterpene hydrocarbons (7.4%) and oxygenated sesquiterpenes (4.0%). The major constituents were myrcene, limonene, (E)-linalool, (Z)--ocimene and caryophyllene oxide.

Ajazzimancini P. (1964) "*Santolina chamaecyparissus*" *Rass Clin Ter*. **63**,123-36.

Baig M.A., Banthorpe D.V. & Branch S.A. (1989). "Hemi and mono-terpenes from callus cultures of *Santolina chamaecyparissus*." *Fitoterapia* **60**,184-186

Barrero A.F., Alvarez-Manzaneda R., Quilez J.F. & Mar Herrador M. (1998) "Sesquiterpenes from *Santolina chamaecyparissus* subsp. *squarrosa*." *Phytochemistry* **43**(5), 807-813. Abstract. Four new sesquiterpenes, (E)-6β-acetoxy-7αH-germacra-4,10(14)diene-1α,2β-diol (1), (4E,9Z)-6β-acetoxy-7-αH-germacra-4,9-diene-1α,2β-diol (2), (E)-6β-acetoxy-7αH-germacra-1(10),4-diene-2β-ol (3) and 6β-acetoxy-5βH,7αH,10βMe-eudesm-4(15)-ene- 1α,2β-dol (4), were identified in the ether extract from the aerial parts of *Santolina chamaecyparissus* subsp. *squarrosa*. Their structures and preferred conformation in solution were determined by spectroscopic methods and molecular mechanics calculations.

Brunke E.J., Hammerschmidt F.J. & Schmaus G. (1992). "Das etherische Öl von *Santolina chamaecyparissus* L. (*Santolina chamaecyparissus* essential oil)". *Parfümerie und Kosmetik* **73** (9): 617–618, 623–624, 626, 628–630, 632, 634–637.

Buolos L. (1983) *Medicinal Plants of North Africa*. pub. Reference Publicns Inc. Mitchigan 1983 p67.

Demirci B., Özek T. & Baser K. H. C. (2000). "Chemical composition of *Santolina chamaecyparissus* L. essential oil." *J. Essent. Oil Res*. **12,** 625-627. ***Cropwatch comments***: Components from amongst the seventy-one substances identified in the essential oil from plants gathered in Turkey (yield 1.6%), included artemisia ketone (38.1%), camphor 11.7% & beta-phellandrene (9.2%), alpha-bisabolol (6.6%), myrcene (4.3%), yomogi alchol (1.5%) & artemisia alcohol (1.5%).

Derbesy M., Touche J, A Zola A. (1989) "The essential oil of *Santolina chamaecyparissus* L."- *Journal of Essential Oil Research*: JEOR (USA), 1989

Garg S.N., Gupta D. & Mehta V.K. & Kumar S. (2001) "Volatile constituents of the essential oil of *Santolina chamaecyparissus* Linn. from the southern hills of India. " *J. Essen. Oil Research* **13**(4), 234-235.

Giner R.M. , Manez S. & Rios J.L. (1993) "Seasonal variations in the essential oil of *Santolina chamaecyparissus* L." *Sci. Pharm* **61**, 169-173.

Grosso, C. Figueiredo, A. C. Burillo, J. Mainar, A. M. Urieta, J. S. Barroso, J. G. Coelho, J. A. Palavra, A. M. (2009) "Supercritical fluid extraction of the volatile oil from *Santolina chamaecyparissus." Separation Science* **32**(18), 3215-3222. Abstract. Supercritical fluid extraction (SFE) of the volatile oil from *Santolina chamaecyparissus* L. flower heads was performed under different conditions of pressure, temperature, mean particle size and CO(2) flow rate. This oil was compared with the essential oil isolated by hydrodistillation (HD). The SFE volatile and essential oils were analysed by GC and GC-MS. The range of the main volatile components obtained with HD and SFE were, respectively: 1,8-cineole (25-30% and 7-48%), camphor (7-9% and 8-14%), borneol (7-8% and 2-11%), terpinen-4-ol (6-7% and 1-4%), terpinolene (1-4% and 1-7%) and isobornyl acetate (1-2% and 1-11%). The chemical composition of the extracts was greatly influenced by the conditions of pressure and temperature used. In fact, it was possible to enrich the sesquiterpene fraction by increasing the pressure from 8 to 9 MPa, while changing the temperature from 40 to 50 degrees C at 90 bar enriched of the volatiles in n-alkanes.

Grosso C., Figueiredo A.C., Burillo J., Mainar A.M., Urieta J.S., Barroso J.G., Coelho J.A. & Palavra A.M. (2009) "Supercritical fluid extraction of the volatile oil from *Santolina chamaecyparissus*." *Separation Science* **32**(19), 3365-3366.

Lam J., Bildsoe H., Christiensen L. P. & Thomasen T. "Chemical constituents of *Santolina chamaecyparissus*." *Acta Chem. Scand*. **43**, 799-802. Abstract. Roots of *Santolina chamaecyparissus* contain besides a number of previously reported acetylenes, an acetylenic isovaleric ester known from *Santolina rosmarinifolia.* The aerial parts of *Santolina chamaecyparissus* contain a series of acetylenes known from the root material and four spiroketalenol ethers known from *Santolina rosmarinifolia.* Furthermore, two previouisly known pre-cursors (*Z*- & *E*- isomers) of several thiophene-furan acetylenes occur in the roots and aerial parts of the plant. The possible presence of a labile sulphur compound is discussed.

Lawrence, B. M. (2005) "Progress in essential oils: juniper berry oil and extract, santolina oil, and angelica seed oil." *Perf. & Flav* **31**(3), 50-58.

Lawrence, B.M. (1993). “A planning scheme to evaluate new aromatic plants for the flavor and fragrance industries.” p. 620-627. In: J. Janick and J.E. Simon (eds.), New crops. Wiley, New York. ***Cropwatch comments***: Production volume of Santolina oil was estimated by the author at 300t/y.

Omidbaigi R. Nasrabadi T. B. & Omidbaigi M. A. (2006) "Volatile oil content and constituents of *Santolina chamaecyparissus* cv. "*caolina*" planted in the north of Teran." *Euro Cosmetics* **14**(5), 19-21.

Pérez-Alonso M.J. & Velasco-Negueruela A. (1992). "Essential oil components of *Santolina chamaecyparissus* L." *Flav. & Frag. J.* **7**, 37-42. Abstract. The essential oils from several *S. chamaecyparissus* subspecies from wild (Spanish insular and peninsular) and cultivated (Spanish and British) populations were examined. According to the composition of the volatiles 3 different groups are proposed: cultivated, insular, and peninsular samples. Artemisia ketone (27.8-35.6%) and T-cadinol (4.8-23.6%) were characteristic components in cultivated samples, whereas in the insular ones camphor (42.9%) and cubenol (17.3%) were the main compounds. Monoterpenes predominated in the essential oils of peninsular populations corresponding to subspecies *incana* (85.9%) and *squarrosa* (45.2%-68.5%), of which camphor (9.2-24.9%), borneol (11.6-28.4%) and 1,8-cineole (2.3-8.7%) were the major components. Conversely, the essential oil of subspecies *tomentosa* was mainly composed of sesquiterpenes (61.4%), elemol (5.0%), nerolidol + spathulenol (9.3%), copaenol (15.2%), ledol (4.1%) and cubenol (6.7%) being the major components.

Villar A., Giner R.M. & Rios J.L. (1986) "Chemical composition of *Santolina chamaecyparissus* ssp. *squarrosa* essential oil". *J Nat Products* **49(**6), 1143-1144.

Waller G.R., Frost G.M., Burleson D, Brannon D. & Zalkow LH. (1968) "Biosynthesis of monoterpenoids by *Santolina chamaecyparissus* L." *Phytochemistry* **7**(2), 213-220. Abstract. Radioactivity from mevalonate-2-14C was shown to be incorporated into β-pinene, myrcene and three unidentified monoterpenes in *Santolina chamaecyparissus* L. Artemisia ketone (3,3,6-trimethyl-1,5-heptadien-4-one), regarded as a non head-to-tail monoterpenoid, did not incorporatesignificant label from mevalonate-2-14C.

Santolina oil: Properties & Uses.

Akerreta S., Cavero S.Y. López V. & Calvo M.I. (2007) "Analyzing factors that influence the folk use and phytonomy of 18 medicinal plants in Navarra." *J. Ethnobiol Ethnomedicine* 2007 **3**,16. Abstract. Background. This article analyzes whether the distribution or area of use of 18 medicinal plants is influenced by ecological and cultural factors which might account for their traditional use and/or phytonymy in Navarra. This discussion may be helpful for comparative studies, touching as it does on other ethnopharmacological issues: a) which cultural and ecological factors affect the selection of medicinal plants; b) substitutions of medicinal plants in popular medicine; c) the relation between local nomenclature and uses. To analyze these questions, this paper presents an example of a species used for digestive disorders (tea and camomile: *Jasonia glutinosa*, J. *tuberosa*, *Sideritis hyssopifolia*, *Bidens aurea*, *Chamaemelum nobile*, *Santolina chamaecyparissus*...), high blood pressure (*Rhamnus alaternus*, *Olea europaea*...) or skin diseases (*Hylotelephium maximum*, *H. telephium*, *Anagallis arvensis*, *A. foemina*). Methods. Fieldwork began on January 2004 and continued until December 2006. During that time we interviewed 505 informants in 218 locations in Navarra. Information was collected using semi-structured ethnobotanical interviews, and we subsequently made maps using Arc-View 8.0

program to determine the area of use of each taxon. Each map was then compared with the bioclimatic and linguistic map of Navarra, using the soil and ethnographic data for the region, and with other ethnobotanical and ethnopharmacological studies carried out in Europe. Results. The results clearly show that ecological and cultural factors influence the selection of medicinal plants in this region. Climate and substrate are the most important ecological factors that influence the distribution and abundance of plants, which are the biological factors that affect medicinal plant selection. Conclusion. The study of edaphological and climatological factors, on the one hand, and culture, on the other, can help us to understand why a plant is replaced by another one for the same purposes, either in the same or in a different area. In many cases, the cultural factor means that the use of a species is more widespread than its ecological distribution. This may also explain the presence of synonyms and polysemies which are useful for discussing ethnopharmacological data.

Giner R.M. & Ríos J.L. (2000) "*Santolina chamaecyparissus*." *Revista de Fitoterapia*. 2000. pp. 27–34

Giner R.M., Ríos J.L. & Villar A. (1989) "Inhibitory effects of *Santolina chamaecyparissus* extracts against spasmogen agonists." *J Ethnopharmacol.* **27**(1-2):1-6. Abstract. Several extracts of *Santolina chamaecyparissus* ssp. *squarrosa* antagonized in a concentration-dependent way the contractions of rat duodenum, guinea-pig ileum, rat vas deferens and rat uterus as induced by acetylcholine, histamine, noradrenaline, oxytocin and serotonin. Polar extracts were less active than apolar extracts, and it was necessary to assay the former at higher concentrations. Only the lyophilized aqueous extract produced a slight hypotensive effect when given intravenously at 150 mg/kg to urethananesthetized rats.

Giner R., Rios J.L. & Villar A. (1986) "Pharmacological study of *Santolina chamaecyparissus*. I. Acute toxicity, antiinflammatory and antiulcer activity." *Planta Med*. **52**(6), 540-1.

Ríos J.L., Giner R.M. & Villar A. (2006) "Isolation and identification of an antiinflammatory principle from *Santolina chamaecyparissus*." *Phytotherapy Res*. **3**(5), 212-214. Abstract. The chloroform extract from *Santolina chamaecyparissus squarrosa* exhibited a potent anti-inflammatory effect on carrageenan-induced oedema in the rat hind paw. -Sytosteryl 3--D-glucoside, isolated by fractionating this extract, was anti-inflammatory in the above test, with intraperitoneal and oral ED50 values of 70 and 146 mg/kg, respectively.

Sala A., Recio M.C., Giner R.M., Máñez S. & Ríos J.L. (2000) "Anti-phospholipase A2 and anti-inflammatory activity of *Santolina chamaecyparissus*." *Life Sci*. **66**(2), PL35-40. Abstract. The activity of the *Santolina chamaecyparissus* methanol extract was tested against the phospholipase A2 (PLA2)-induced mouse paw edema and in vitro inhibition of PLA2 activity. After fractionation, only the dichloromethane extract was active against the PLA2 in vitro test. In addition, it reduced the edema induced by arachidonic acid, and by

12-O-tetradecanoylphorbol-13-acetate in a multidose test. After chromatography on silicagel and gel filtration on Sephadex, and using an in vitro anti-PLA2 assay-guided process, we have isolated and identified from the dichloromethane extract the flavone nepetin and four sesquiterpenes.

Da Silva J.A.T. (2004) "Mining the essential oils of the Anthemidea." *African J. Biotechnology* **3**(12), 706-720. Abstract. Numerous members of the Anthemideae are important cut-flower and ornamental crops, as well as medicinal and aromatic plants, many of which produce essential oils used in folk and modern medicine, the cosmetic and pharmaceutical industries. These oils and compounds contained within them are used in the pharmaceutical, flavour and fragrance industries. Moreover, as people search for alternative and herbal forms of medicine and relaxation (such as aromatherapy), and provided that there are no suitable synthetic substitutes for many of the compounds or difficulty in profiling and mimicking complex compound mixtures in the volatile oils, the original plant extracts will continue to be used long into the future. This review highlights the importance of secondary metabolites and essential oils from principal members of this tribe, their global social, medicinal and economic relevance and potential.

Suresh B., Srirama S., Dhanaraja S.A., Elangoa K. & Chinnaswamy K. (1997) "Anticandidal activity of *Santolina chamaecyparissus* volatile oil." *Journal of Ethnopharmacology* **55**(2), 151-159. Abstract. A search for naturally occurring drugs with antifungal activity lead to Santolina oil, a volatile oil distillate of *Santolina chamaecyparissus*. The studies revealed that Santolina oil was effective in controlling experimental candidiasis in vitro and in vivo. It had a synergistic effect on clotrimazole in controlling *Candida albicans* in vitro. It significantly controlled experimental vaginal candidiasis and experimental systemic candidosis. Santolina oil was able to control the superficial cutaneous mycoses. It is recommended as a potential candidate for further studies, including clinical studies.

Suresh B., Kalyanaraman V.R., Dhanasekaran S., Annadurai K., Dhanaraj S.A. & Balasubramanian S. (1995) "Evaluation of santolina oil in search of new drugs against candidiasis." *Indian J Pharmacology* **27**(3), 171-177. Abstract. An essential oil obtained from the herb of *Santolina chamaecyparissus* Linn. (Compositae) was evaluated for its antifungal activity against candidiasis. It was effective in controlling candidiasis both in vivo and in vitro. It also possessed antibacterial activity and the toxicity studies revealed the safety profile of the drug.

Tognolini M., Barocelli E., Ballabeni V., Bruni R., Bianchi A., Chiavarini M. & Impicciatore M. (2006) "Comparative screening of plant essential oils: Phenylpropanoid moiety as basic core for antiplatelet activity," *Life Sciences* **78**(13), 1419-1432. Abstract. Essential oils extracted from different plants (*Anthemis nobilis* L., *Artemisia dracunculus* L., *Cannabis sativa* L., *Cupressus sempervirens* L., *Cymbopogon citratus* (DC.) Stapf., *Curcuma longa* L., *Foeniculum vulgare* L., *Hypericum perforatum* L., *Hyssopus officinalis* L., *Mentha spicata* L., *Monarda didyma* L., *Ocimum basilicum* L., *Ocotea quixos* Kosterm.,

Origanum vulgare L., *Pinus nigra* J.F. Arnold, *Pinus silvestris* L., *Piper crassinervium* Kunth., *Rosmarinus officinalis* L., *Salvia officinalis* L., *Salvia sclarea* L., *Santolina chamaecyparissus* L., *Thymus vulgaris* L., Zingiber *officinaie* L.) were screened in guinea pig and rat plasma in order to assess antiplatelet activity and inhibition of clot retraction. The oils were chemically analysed and a relationship between components and ability to affect hemostasis was evidenced. *O. quixos*, *F. vulgaris*, and *A. dracunculus* showed the highest antiplatelet activity against ADP, Arachidonic Acid and the Thromboxane A2 agonist U46619 (IC50, 4–132 μg ml– 1), and a good ability to destabilize clot retraction (IC50, 19–180 μg ml– 1). For these oils a significant correlation between antiplatelet potency and phenylpropanoids content (54–86%) was evidenced thus suggesting a key role for this moiety in the prevention of clot formation. These findings provide the rationale to take in account the antiplatelet activity in the pharmacological screening of natural products containing phenylpropanoids.

Safety.

Giner R.M., Ríos J.L. & Villar A. (2006) "CNS depressant effects, anti-inflammatory activity and anti-cholinergic actions of *Santolina chamaecyparissus* extracts." *Phytotherapy Res*. **2**(1), 37-41. Abstract. The pharmacological activity of several extracts together with the lyophilized infusion of *S. chamaecyparissus* ssp. *squarrosa* were investigated. The lethal dose 50% (LD50), effect on animal metabolism, mechanical and thermic analgesia and spontaneous, anti-inflammatory, and anti-ulcer activity have been determined. Studies on isolated organs (rat duodenum and rat uterus) were also carried out. The hexanic and chloroformic extracts were potent antagonists of the thermic analgesia test; the former extract was also active in the mechanical analgesia test. The chloroformic extract and, to a lesser extent, the ethyl acetate extract and lyophilized infusion demonstrated noteworthy activity as anti-inflammatory agents. No extract produced an ulcerogenic effect. The hexanic extract had the highest inhibitory effect on ACh induced contraction of rat duodenum and the ethyl acetate extract of oxytocin induced contraction of rat uterus.