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# CHEMICAL CONSTITUENTS AND DESCRIPTIVE PROPERTIES OF *SAPONARIA VACCARIA* PLANT : A REVIEW

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## Abstract

*Saponaria vaccaria* L. (cow cockle) is monotypic genus from family Caryophyllaceae is a yearly Herb broadly dispersed over Asia, Europe, What's more other parts of the universe. Those seeds about this plant would referred to universal Chinese solution Likewise Wang-Bu-Liu-Xing, which will be endorsed for the medicine from claiming amenorrhea, breast infections, and the incitement about lactation. Those warm conductivity, particular heat, What's more warm diffusivity about *Saponaria vaccaria* seed particles were dead set toward temperatures extending starting with 25°C with 55°C. A few accessions for encountered with urban decay because of deindustrialization, engineering imagined, government lodgin. Vaccaria need A while ago been investigated concerning illustration a possibility new crop for the northern incredible Plains region, owing primarily of the fantastic agromania qualities about this species. This plant has been used in herbal medical fields to Anticancer Furthermore anti-infective there mixes the rate of pills with regular results concerning illustration their sourball need expanded on through 60%. Its poisonous quality against worms, Paramecium, and different unicellular organic entities is additionally news person. *S. vaccaria* was present in only 4% of the same surveys.

***Keywords***: *Saponaria vaccaria*, Cow cockle, Seeds, Saponins, Flavonoids, Root, Glycosides.

## Introduction

For centuries, most plants and herbs have been used to treat various wounds, diseases, and injuries. As these powerful active substances found in plant parts were extracted and purified for use in the pharmaceutical industries, especially in the past few decades, for the purpose of treating the human race (Shrestha and Baik, 2011). *Saponaria vaccaria* L. (cow cockle) (Goering *et al*., 1966; Alex, 1968; Mazza *et al*., 1992; Duke and Bogenschutz, 1994; Ferrie *et al*., 2009). 'Pink Beauty (Hakkaart and Van Olphen, 1971; Hakkaart, 1972; Lawson and Hearon, 1974) *Saponaria vaccaria* (*Vaccaria segetalis*, *Vaccaria hispanica*; Caryophyllaceae) this plant will be an yearly herb should an extensive degree spread in Asia, Europe Also Different parts of the globe. The seeds of this plant would referred to for universal Chinese drug Concerning illustration Wang-Bu-Liu-Xing, which will be specified of the help about menopause, breast infections, breast-stimulating (Kernan and Ferrie, 2006; Meesapyodsuk *et al*., 2007). The thermic accessibility is particular temperature and thermic Diffusivity from claiming *S. vaccaria* 'monotypic genus' (KOÇYİĞİT, 2018) Seed particles were decided at temperatures going starting with 25°C will 55°C, dampness content starting with 15. 35% with 80% dry basis, What's more powerful thickness from 516. 5 should 1328. 05 kg $m^{-3}$ (Hearon and Lawson, 1980; Hearon and Lawson, 1981; Shrestha and Baik, 2010). Maximum germination was obtained at 2 h for cow cockle (Hsiao, 1979). A few accessions of *Saponaria vaccaria* need Awhile ago been investigated as An possibility new crop to those northern extraordinary plains region, owing mostly of the phenomenal agromania qualities about this species and the secondary content of a unique, little-grained starch. (Balsevich *et al*., 2006). This plant has been used in herbal medical fields (Hayder *et al*., 2020). For anticancer Also anti-infective exacerbates the rate of pills with regular items Similarly as their hotspot need expanded with In 60% (Shrestha and Baik, 2020). Its poisonous quality against worms, Paramecium, and other unicellular organic entities will be also news person (Kazmi *et al*., 1989). *Saponaria vaccaria* was present in only 4% of the same surveys (Alex, 1970). Those abandons need aid opposite, 2-8 cm long, smooth, sessile, What's more blue will green for shade. The blooms need 5 petals united to structure An calyx, funnel-shaped, pale red 9 with profound pink, and inexactly aggregated In the finishes for stems. Pharmacognostical evaluation by Toward standard system to examination for sorts for trichomes, stomata, phloem, starch, fibers the abandons from claiming plant were inundated for chloral hydrate result to a few minutes to lost its shade What's more pigments What's more analyze under magnifying instrument (Falih *et al*., 2019).

### Vernacular Names

There are large portions basic names to *S. vaccaria* plant in Pink Beauty, White Beauty, Cow Cockle, Soapwort, *Vaccaria segetalis*, *Vaccaria hispanica* (Schmidt *et al*., 2007; Khare, 2008).

| Scientific classification | |
|---|---|
| Kingdom: | Plantae |
| *Clade*: | Angiosperms |
| Order: | Caryophyllales |
| Family: | Caryophyllaceae |
| Genus: | *Vaccaria* |
| Species | *Saponaria vaccaria L.* |

**Fig. 1 :** Leaves and flowers of *Saponaria vaccaria* L. plant

**Medicinal use for *Saponaria vaccaria*:**

*S. vaccaria* utilized to cough, bronchitis, stomach disorders, bone deformations, rheumatism, pimples, skin diseases, bile disorders, hepatic eruptions, venereal ulcers, respiratory framework diseases, jaundice, & pee remover, the adhesive sap utilized as febrifugal, in unending fevers, medicine for furuncles & scabies (Chandra and Rawat, 2015).

**Table 1 :** Phytochemistry review

| Plant part | Constituent reported |
|---|---|
| Leaves | Triterpenoid saponins, Steroidal saponins (Frechet, 1991). |
| Fruit | Triterpenoid saponins, Steroidal saponins, Steroidal glycoalkaloids (Morrissey, John, 1999) |
| Root | Triterpenoid saponins, Steroidal saponins (Frechet, 1991). |
| seeds | Protein 12% to 15%; oil 3% to 4% What's more starch 65% to 70% , alkaloids, cyclopeptides , phenolic, steroids and saponins (Sang *et al*., 2003; Ho *et al*., 2003; Condie *et al*., 2011) glycosides of triterpenes, Flavonoids, fatty acids (Biliaderis *et al*., 1993; Balsevich *et al*., 2012). |

**Saponins of *S. vaccaria***

Happening to encountered with urban decay because of deindustrialization, engineering imagined, government lodgin. Vaccaria seeds are glycosides of triterpenes. The principle sorts from claiming saponins relate of the quillaic corrosive sort and these accounts to more or less 65% about downright saponins, likewise exhibit would gypsogenin bisdesmosides, gypsogenic acid monodesmosides and vaccaric acid bisdesmosides (Ramirez-Erosa, 2008; Pelegrini *et al*., 2008; Doughari, 2012; Garai, 2016).

**Glycosides of *S. vaccaria***

The corrosive hydrolysis about vaccarin offered a mixture for two substances for flavonoid way and sugars (D-glucose Furthermore L-arabinose) which were recognized chromatographically. The extent of the joined together flavonoid substances shaped looking into hydrolysis added up should 60% of the weight of the introductory glycoside. Consequently, around corrosive hydrolysis one atom every for glucose Furthermore arabinose might have been part off. The flavonoid results about corrosive hydrolysis were differentiated with respect to a section from claiming polyamide sorbent. Both these substances, Additionally demonstrated on make glycosides, in any case they were not cleaved by the ordinary hydrolysis for acids, undergoing shared isomerization to structure an harmony mixture following constantly warmed for 10% hydrochloric corrosive for 3 hours. Ahead hydrolysis for Kiliani's mixture, these exacerbates provided for apigenin and, Likewise sugars, D-glucose with a little sum for D-arabinose. On the premise of these properties, both flavonoids must a chance to be C-glycosides (Baeva *et al.*, 1979).

**Flavonoids of *S. vaccaria***

Flavonoids in *Saponaria vaccaria* are pathologically important to the plants aerial plant parts such as stem, leaf and flower and seeds. that study to flavonoid content Kaempferol and quercetin were identified in plant parts and callus tissue culture from *S. vaccaria*, on the basis of their Rf values in different solvent systems, UV flourescence, colours on exposure to ammonia and spraying reagents Kaempferol which is a strong antimicrobial substance has been reported from many plant species (Harborne, 1964).

## Conclusion

*Saponaria vaccaria* one of the medicinal plant which widely used in traditional medicine and distribution in different countries specially A Asia, Western Europe What's more various parts of the universe and containing many active ingredients in all types of plant specially in stem, leaf and flower and seeds. that study to flavonoid content Kaempferol and quercetin were identified in plant parts and callus tissue culture and polyphenols which responsible for abundant biology activity, pharmacologic uses like antinociceptive effects, Anti-oxidant efficiency, hepatoprotective efficiency, Anticancer activity, hypercholesterolemia, diabetes and fertility unrest.

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## References


Shrestha, O.D. and Baik, B.L. (2011). "Permittivity of mixtures of *Saponaria vaccaria* and ethanol–water solution for RF heating assisted extraction of saponins," IEEE Trans. Instrum. Meas., 60(8): 2861–2871.

Goering, J.; Eslick, K.J.; Watson, R.F. and Keng, C.A. (1966). "Utilization and agronomic studies of cow cockle (*Saponaria vaccaria*)," Econ. Bot., 20(4): 429–433.

Alex, J.F. (1968). "Competition between linseed flax and *Saponaria vaccaria*," Can. J. Plant Sci., 48(2): 139–147.

Mazza, B.D.; Biliaderis, G.; Przybylski, C.G. and Oomah, R. (1992). Compositional and morphological characteristics of cow cockle (*Saponaria vaccaria*) seed, a potential alternative crop, J. Agric. Food Chem., 40(9): 1520–1523.

Duke, M.J. and Bogenschutz, J. (1994). Dr. Duke's phytochemical and ethnobotanical databases, 1-8.

Hakkaart, M. and Van Olphen, F.A. (1971). *Saponaria vaccaria* 'Pink Beauty', a new test plant for carnation mottle virus, Netherlands J. Plant Pathol., 77(4): 127–133.

Hakkaart, F.A. (1972). Detection of carnation viruses with the test plant Saponaria vaccaria 'Pink Beauty', vol. 36.

Lawson, S.S. and Hearon, R.H. (1974). Ultrastructure of carnation etched ring virus-infected *Saponaria vaccaria* and *Dianthus caryophyllus*, J. Ultrastruct. Res., 48(2): 201–215.

Meesapyodsuk, P.S.; Balsevich, D.; Reed, J.; and Covello, D.W. (2007). Saponin biosynthesis in *Saponaria vaccaria*. cDNAs encoding β-amyrin synthase and a triterpene carboxylic acid glucosyltransferase, Plant Physiol., 143(2): 959–969.

Kernan, A.M.R. and Ferrie, Z. (2006). Microspore embryogenesis and the development of a double haploidy protocol for cow cockle (*Saponaria vaccaria*), Plant Cell Rep., 25(4): 274–280.

KOÇYİĞİT, A.L.P.Ş. (2018). Seed Morphology, Leaf Anatomy and Karyotype Analysis of the medicinal and ornamental plant; *Vaccaria hispanica* (Miller) Rauschert," *Yüzüncü Yıl Üniversitesi Tarım Bilim. Derg.*, 28(1): 10–18.

Shrestha, O.D. and Baik, B.L. (2010). Thermal conductivity, specific heat, and thermal diffusivity of *Saponaria vaccaria* seed particles, Trans. ASABE, 53(5): 1717–1725.

Hearon, R.H. and Lawson, S.S. (1980). The effects of temperature on the ultrastructure of carnation etched ring virus infected saponaria vaccaria leaf cells, 110: 1980.

Hearon, R.H. and Lawson, S.S. (1981). Effects of light intensity, photoperiod, and temperature on symptom expression and host and virus ultrastructure in *Saponaria vaccaria* infected with carnation etched ring virus, *Phytopathology*, 71(6): 645–652.

Hsiao, A.I. (1979). The effect of sodium hypochlorite, gibberellic acid, and light on seed dormancy and germination of wild buckwheat (*Polygonum convolvulus*) and cow cockle (*Saponaria vaccaria*), Can. J. Bot., 57(16): 1735–1739.

Balsevich, I.; Bishop, J.J. and Ramirez-Erosa, G.G. (2006). Analysis of bisdesmosidic saponins in *Saponaria vaccaria* L. by HPLC-PAD-MS: identification of new quillaic acid and gypsogenin 3-O-Trisaccharides, Phytochem. Anal. An Int. J. Plant Chem. Biochem. Tech., 17(6): 414–423.

Hayder Yousif Falih, T.M.J.; Suhad, Y.A.; Saba, A.A. (2020). Antibacterial activity and phytochemical screening of Iraqi *Taraxcum officinale* L., Dian J. forensic Med. Toxicol., 14(2).

Shrestha, O.D. and Baik, B.L. (2012). Methanol-Water Extraction of Saponins From Seeds of *Saponaria vaccaria* L.—Calibration Equation, Extraction Condition Analysis, and Modeling," *Sep. Sci. Technol.*, 47(13): 1977–1984.

Kazmi, A.; Ahmed, S.N.U.H. and Malik, Z. (1989). Sapxanthone, a pentasubstituted xanthone from *Saponaria vaccaria*, Phytochemistry, 28(12): 3572–3574.

Alex, J.F. (1970). Competition of *Saponaria vaccaria* and *Sinapis arvensis* in wheat, Can. J. Plant Sci., 50(4): 379–388.

Falih, T.M.J.; Hayder, Y.; Noor, M.N. (2019). Pharmacognostical Study and Antibacterial Activity of Cardio Active Glycoside of Iraqi Yellow Oleander (*Thevetia peruviana* L.), Indian J. Public Heal. Res. Dev., 10(10): 3128–3131.

Schmidt, P.S.; Moore, J.F.; Pelcher, M.D. and Covello, L.E. (2007). High efficiency Agrobacterium rhizogenes-mediated transformation of *Saponaria vaccaria* L. (Caryophyllaceae) using fluorescence selection, Plant Cell Rep., 26(9): 1547–1554.

Khare, C.P. (2008). Indian medicinal plants: an illustrated dictionary.

Chandra, D.S. and Rawat, S. (2015). Medicinal plants of the family Caryophyllaceae: a review of ethno-medicinal uses and pharmacological properties, Integr. Med. Res., 4(3): 123–131.

Frechet, M.V.; Denise, B.C.; Bertrand, M.S. and Hartmut, F. (1991). Four triterpenoid saponins from dried roots of *Gypsophila* species, Phytochemistry, 30(3): 927–931.

Morrissey, A.E.O. and John P. (1999). Fungal resistance to plant antibiotics as a mechanism of pathogenesis, Microbiol. Mol. Biol. Rev., 63(3): 708–724.

Sang, Y.F.; Shengmin, A.L.; Zhongliang, C. and Jun, U. (2003). Chemistry and bioactivity of the seeds of *Vaccaria segetalis*, Am. Chem. Soc., 279–291.

Ho, Q.Y.Z.; Chi-Tang, Jen-Kun Lin (2003). Oriental foods and herbs, Am. Chem. Soc.

Condie, P.S.C.; Janet, A.; Goska, N.; Darwin, W.R.; Balsevich, J.J.; Martin, J.T.R.; Paul, G.A. (2011). The biosynthesis of Caryophyllaceae-like cyclic peptides in *Saponaria vaccaria* L. from DNA-encoded precursors, Plant J., 67(4): 682–690.

Biliaderis, R.P. and Mazza, C.G. (1993). Composition and physico-chemical properties of starch from cow cockle (*Saponaria vaccaria* L.) Seeds," *Starch-Stärke*, 45(4): 121–127.

Balsevich, L.K.; Ramirez-Erosa, J.J.; Hickie, I.; Dunlop, R.A.; Bishop, D.M. and Deibert, G.G. (2012). Antiproliferative activity of S*aponaria vaccaria* constituents and related compounds, Fitoterapia, 83(1): 170–181.

Ramirez-Erosa, I.J. (2008). Studies on Triterpene Saponins from' *Saponaria vaccaria* [/] Seed and Their Apoptosis-inducing Effect on Human Cancer Cell Lines, Dr. Diss. Univ. Saskatchewan, 2008.

Doughari, J.H. (2012). Phytochemicals: extraction methods, basic structures and mode of action as potential chemotherapeutic agents.

Pelegrini, I.C.; Tsuzuki, D.D.; Amado, J.K.; Cortez, C.A. and Ferreira, D.A. (2008). Biological activity and isolated compounds in *Sapindus saponaria* L. and other plants of the genus Sapindus, Lat. Am. J. Pharm., 27.

Garai, S. (2016). Advances in triterpenoid saponins research 2007-2012, Herb. Med, 2(3): 2472–0151.

Baeva, N.K.; Karryev, R.T.; Litvinenko, M.O. and Abubakirov, V.I. (1979). Glycosides of *Vaccaria segetalis* V. Vaccarin, Chem. Nat. Compd., 10(2): 182–186.

Harborne, J.B. (1964). Biochemistry of phenolic compounds, Biochem. phenolic Compd., 1964.