S.Swati et al /J. Pharm. Sci. & Res. Vol. 10(9), 2018, 2166-2168

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

# A Phyto Pharmacological Review on *Cotoneaster microphyllus* Species

**S.Swati*[1],R.R. Manjula[2],K.Sowjanya[3],Y.Vennela[4],K.Tanuja[5]**

[1]*Assistant Professor,Department of Pharmaceutics,Nirmala college of Pharmacy,Atmakur,Guntur,A.P,India*

[2,3]*Associate Professor, Department of Pharmaceutical and Phytochemistry,,Nirmala college of Pharmacy,Atmakur,Guntur,A.P,India*

[4,5] *Bachelor of Pharmacy, Nirmala college of Pharmacy,Atmakur,Guntur,A.P,India*

**Abstract:**

Rockspray *Cotoneaster* is a prostrate, mat-forming shrub which will climb over rocks. It is a strong contender for the plant found at highest altitudes.In this review a brief discussion of *cotoneaster microphyllus* species were discussed and compared its habit and habitats of various species . It has wide uses and benefits along with toxic effects as well as phytochemical and pharmacological activity responsible for anti diabetic activity and anti diarrhoearial activity.

**Keywords :** *cotoneaster microphyllus*, toxic effects, phytochemical and pharmacological activity.

## INTRODUCTION:

*Cotoneaster microphyllus* is a evergreen unpopular plant mostly found in the hill station areas *Cotoneaster microphyllus* is a medicinal plant belonging to the family rosaceae and is a rich source of flavonoids and glycosides which are distributed in the parts leaves,berries,flowers of the plant. These flavonoids have found extensive application in the treatment of dysmennrohea and dermatitis.The cyanoglycosides are found in the part of the fruit, leaf, and bark,stolons which has potential as astringent property . It is important to mention that the part of the cotoneaster microphyllus plant that berries were poisonous causing gastro enteritis if consumed.Cotoneaster microphyllus is well suited for use as an ornamental because of its graceful white flowers in spring and brilliant red fruit in autumn.[1]And the Leaves cotoneaster microphyllus plants are used for Dermatitis.[2]These shrubs with height-50 to 100cm and width 1 to 1.5cm.[3] And these plants are trailing on rocks on grassy hillsides about 1200-5400mt and river valleys at elevations of 2000-4200mt.[4] These are low growing , spreading shrubs and mostly grown in hill and cold place. [5] And the favourable soil type for this plant is clay,sandy,and heavy soils.This can cultivated on all type of pH like acidic,basic,neautral.The required heat zones of this plants are light shade and it require moderate water for growth.The life type of this plants are evergreen and the life cycle is perennial.[6]. It prefers good soil but also grown in poor soils.Most of these are slow growing hybridization easily with other genus.Cotoneaster will tolerate range of soil types-from the poor dry soils to moist fertile loams.For best results plant in full sun,this shrub will happily grown under partial shade.Prune to shape in spring-removing wood if necessary. It is important it protect from wild sources or pesticides.The fruit is very much like to bees.In this stored seed germinate faster it given 3 months warm stratification at $15^0$c and 3 months cold stratification at $4^0$c and seed germinates with in 1-8meters it takes 2 yeas at $15^0$c.[7]

**Botanical Classification:**

Kingdom : Plantae
Order : Rosids
Family : Rosaceae
Subfamily : Amygdaloideae
Tribe : Maleae
Subtribe : Malinae[8]

**INTRODUCTION OF *COTONEASTER MICROPHYLLUS* SPECIES:**

***Co****toneaster microphyllus* is one of the species in the genus of *cotoneaster*.This *cotoneaster microphyllus* had 4 sub species and their morphological descriptions are as follows:

- ***Cotoneaster microphyllus var. Conspiocuus***
  It has a wider growth form and broader leaves and fruits, and occurs at elevations of 2,700–3,300 m in the Brahmaputra River valley, Tibet. The fruit has important ornamental value due to its persistent brilliant color.[9] Common name is cotoneaster conspicuous Decorus.[10]And these are native to south east Tibet.It grows to 1to 1.5 meters height with white five stellate flowers followed by fruit.[11]
- ***Cotoneaster microphyllus var . glacialis***
  Very rarely offered,this wild collected seed was found at an altitude of 4,000 meters in Nepal where it cover rocks and ground with total creeping carpets smotheres in white flowers in spring.Later comes impressive display of dazzling red berries.[12]These are shrubs reach heights of 50 to 70 cm.And bluish green simple alternate leaves.They are elliptic.These plants are native to Himalayas.[13]
- ***Cotoneaster microphyllus var. cochleatus***
  This type with revolute leaves, and occurs in Yunnan and Sichuan.[14] The species is native in Himalayas,Nepal,Sikkim and in south western china.These are low dwarf shrubs.forming very dense and low dark green hummocks.The leaves are ever green,alternate,small,elliptic to obovate and margins are rolled downwards.It has white solitary flowers in may to june.The fruits are brilliant red and globose. [15]
- ***Cotoneaster microphyllus var. Thymifollyus***
  It has relatively narrow, revolute leaves and bright red fruit, occurs at elevations of 3,000-4,000 m, in northwestern Yunn[16] It has tiny leaves with rolled edges.And first are in dark red colour.In early summer the it produces pink buds that open to white flowers.The main branches are horizontal but secondary branches are held more upright and arching especially when weighed with berries.It is a ever green shrub and it can grow both in acidic and neutral pH.[17]

**Folklore Uses :**

- The Stolons are used as Astrigent. Stolons are also ued as haemostatic. And it is refered that this plants also useful to treat Diarrhoea.[26]
- Dried leaves are used for incens(incence is aromatic biotic material which release smoke when burned) [27]
- Fruits are used for irregular menstruation and in disease of bile malfunctioning.[28]

**Other uses of fruits :**

- Fruits can make adequate jellies if mixed with sweet apples for a *cotoneaster microphyllus*
- Fruits are made into paste and mixed with brassica oil and applied on skin aganist irritation.[29]
- Fruits as Rose – tan dye to reduce bitter taste [30]
- The leaves and stems and branches of this also Used for fencing, sheltering etc.,

**Brief description about morphological characters of species C*otoneaster microphyllus* species:**

| Description | *C.M.VAR.COCHLEATUS* | *C.M.VAR.THYMIFOLIUS* | *C.M.VAR.CONSPIOCUUS* | *C.M.GLACIALIS* |
|---|---|---|---|---|
| Habit | low dwarf shrub | ever green shrub | ever green shurb | Shrubs |
| Native | Nepal,Himalayas,Sikkim | North western yunn | Bramhaputhra river valley,Tibet | Nepal[18] |
| Leaf | Ever green,alternate,small elliptic and margins are rolled downwards | Tiny leaves with rolled edges | small , glossy dark green | Bluish green,simple alternate and elliptic |
| Flower | White solitary flowers in May or June | In early summer produces pink buds and later open into white flowers | White five stellate flowers | Five stellate flowers from June to July |
| Fruit | Brilliant red berries[19] | Dark red berries | Red berries [20] | Red berries[21] |
| Soil type | Sandy,chalk,loamy,clay | Soil type :well dried sandy loams | Sandy,loamy,clay,chalk | Poor dry soils to moist fertile loams |
| pH | acidic,basic,neutral[22] | acidic,neutral[23] | acidic,basic,neutral[24] | acidic,basic,neutral[25] |

**TOXICITY:**

The California Poison Control Center lists cotoneasters as Level 4 toxic plants. Ingesting their poisonous parts affects the heart, liver, kidney or brain. Cotoneasters' leaves, berries and flowers all contain cyanogenic glycosides. These toxins convert to cyanide during digestion, but cotoneasters' low concentrations of them mean an adult would have to eat a large amount to suffer serious symptoms. For pets or children, however, the risk of a serious reaction is much higher.[31]

**Statement by cooper about cotoneaster microphyllus:**

Copper in (1902) described 3 cases of acute dermatitis of the hands,wrists,face and thighs in gardeners who had clipped extensive cotoneaster microphyllus headges. He noted that the leaves of the plant thickly covered with filiform white hair with a shapely pointed free extremity. These he believed that ,were responsible for the dermatitis.. The eruptions, which had an erythematory and urticarial appearance resolved after 10 to 14 days. Intense, irritation was the worst feathure of these cases .The head gardener later reported that further slight cases occurred in spite of the men wearing gloves and keeping their sleeves turned down.[32]Cassaniti et al.(2009) showed that the decrease in shoot dry weight and leaf area were the first visible effects of salanity both in sensitive and tolerant species in cotonaster.[33]

**NATURAL ENEMIES OF COTONEASTER [34]:**

Eight fungi and three arthropods are reported to attack members of the genus cotoneaster.

**Fungi:**

| Phylum | Family | Species |
|---|---|---|
| Ascomycota | Erysiphaceae | *Phyllactinia pyri* |
| Basidiomycota | Incertae sedi | *Aecidium cunninghamianum & Coleopuccinia kunmingensis & Roestelia nanwutaiana&Roestelia sikangensis* |
| Basidiomycota | Pucciniaceae | *Gymnosporangium clavariiforme & Gymnosporangium confusum* |
| Anamorphic Mycosphaerella | | *Pseudocercospora cotoneastri* |

**Arthropods:**

| Order | Family | Species |
|---|---|---|
| Coleoptera | Scolytidae | *Scolytus abaensis* |
| Homoptera | Pseudococcidae | *Pseudococcus comstocki* |
| Lepidoptera | Arctiidae | *Arctia flavia* |

**PHYTOCHEMICAL INVESTIGATIONS:**

The main chemical constituent present in cotoneaster species are leaf FLAVONOIDS[35] and GLYCOSIDES.These chemical constituents present in leaves,berries and flowers.[36]

**Flavonoids**

Flavonoids represent a large class of at least 6000 phenolic compounds found in fruits, vegetables, nuts, grain seeds, cocoa, chocolate, tea, soy, red wine, herbs and beverage products. Structurally, flavonoids consist of two aromatic rings linked by a 3-carbon chain that forms an oxygenated heterocyclic ring . There are six subclasses of flavonoids including flavones, flavonols, flavanones, flavonols, isoflavones[37]

**Cynogenic Glycosides**

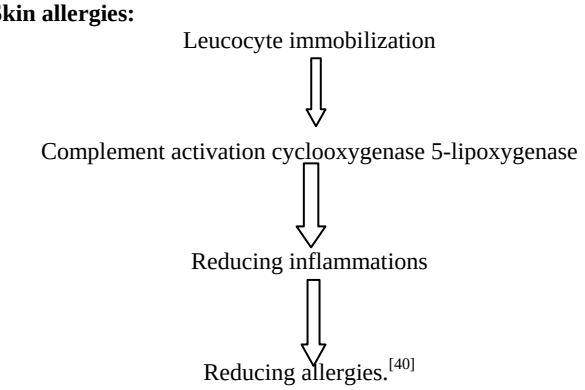
These are secondary metabolites of plants.They are used as defensive system to prevent the attack from herbivorous. Cynogenitic glycosides were found to be present in the leaf,bark and fruit of cotoneaters.The leaf was found to have the greatest cynogenic glycosides and fruit atleast.Seasonal variation was found to be greates in the fruit so cynogenic glycosides content decreased in the fruit aged.[38]

**PHARMACOLOGICAL ACTIVITY**

**Anti-diabetic activity:**

It is biologically plausible that consumption of flavonoids or flavonoid-rich foods may reduce the risk of diabetes. This functional foods and phytomedicines play positive roles in maintaining blood glucose levels, glucose uptake and insulin secretion and modulating immune function to prevent specific DM . In current years various approaches have been made to utilize the flavonoids in vitro and in vivo models by incorporating few novel methods to improve its antidiabetic activity[39]

**Skin allergies:**



## CONCLUSION:

The review on C. Microphyllus is important in identifying grey areas in the research on this plant species and also provides comprehensive data thus far to continue research on this plant.

## REFERENCES :


1. Hao Zheng, Yun Wu, Jianqing Ding, Denise Binion, Weidong Fu and Richard Reardon. Invasive Plants of Asian Origin Established in the United States and Their Natural Enemies volume 1 .
2. Tingles catalogue 1937 pg 1-56.available at http://wiki.irises.org/pub/Hist/Info1937CatalogTingles/1937_TINGLES_CATALOG.pdf
3. Cotoneaster_microphyllus Aug 3-2013 :available at http://en.hortipedia.com/wiki/Cotoneaster_microphyllus
4. Cotoneaster microphyllus :the plant list-the working list of all species available at http://www.theplantlist.org/tpl1.1/record/rjp-374 Wall.
5. BCP/Cotoneaster microphyllus-Wikiversity available at https://en.wikiversity.org/wiki/BCP/Cotoneaster_microphyllus
6. Practical plants: Cotoneaster microphyllus a perennial woody evergreen member of the Cotoneaster genus in the family Rosaceae May 4-2013 available at http://practicalplants.org/wiki/Cotoneaster_microphyllus
7. Plants for a future :Cotoneaster franchetii boiss available at https://www.pfaf.org/USER/Plant.aspx?LatinName=Cotoneaster+franchetii
8. Cotoneaster : available at https://en.wikipedia.org/wiki/Cotoneaster
9. Eurobodolla shire council :Cotoneaster spp.cotoneaster available at http://www.esc.nsw.gov.au/living-in/about/our-natural-environment/introduced-plants-and-animals/weeds/weed-profiles/cotoneaster-cotoneaster-spp
10. Royal horticulture society Ground cover plants/RHS Gardening available at https://www.rhs.org.uk/advice/profile?PID=818
11. Cotoneater conspicuous : https://en.wikipedia.org/wiki/Cotoneaster_conspicuus
12. Learn to grow:Cotoneaster microphyllusvar: available at http://www.learn2grow.com/plants/cotoneaster-microphyllus-var-thymifolius/
13. Biolib.cz Cotoneaster microphyllus var. glaciali Oct 29,2013 : available at https://www.biolib.cz/en/taxon/id1081893/
14. Cotoneaster spp. Page no1-3 available at https://bugwoodcloud.org/bugwoodwiki/Cotoneaster.pdf
15. Cotoneaster spp. Page no1-3 available at https://bugwoodcloud.org/bugwoodwiki/Cotoneaster.pdf
16. Invasive Plants of Asian Origin Established in the United States and Their Natural Enemies Volume 1 available at www.fs.fed.us/foresthealth/technology/pdfs/IPAOV1ed2.pdf
17. The plant list - working list of all plant species version 1 on dec 2010 available at www.theplantlist.org
18. Plant world seeds available at www.plant-world-seeds.com/store/view-seed-item/5328
19. Plant world seeds available at www.plant-world-seeds.com/store/view-seed-item/5328
20. Cotonaester dammeri available at https://wikivisually.com/wiki/Cotoneaster_dammeri
21. Cotoneaster-microphyllus-var.glacialis hortipedia available at en.hortipedia.com/wiki/Cotoneaster_microphyllus_var._glacialis
22. Cotoneaster-cochleatus: available at https://www.99roots.com/en/plants/cotoneaster-cochleatus-p36852
23. Cotoneaster microphyllus thymifolius available at https://www.sunnygardens.com/garden_plants/cotoneaster/cotoneaster_0807.php
24. Cotoneaster conspicuous decorus available at https://www.rhs.org.uk/Plants/95985/Cotoneaster-conspicuus-Decorus/Details
25. Find me plants:coton. available at www.gpert.caldoucments/Bib.cotoneas.pfd.easter-glacialis : http://www.findmeplants.co.uk/plant-cotoneaster-glacialis-2762.aspx
26. Plants for a future :Cotoneaster franchetii boiss available at https://www.pfaf.org/USER/Plant.aspx?LatinName=Cotoneaster+franchetii
27. Practical plants: Cotoneaster microphyllus a perennial woody evergreen member of the Cotoneaster genus in the family Rosaceae May 4-2013 available at http://practicalplants.org/wiki/Cotoneaster_microphyllus
28 Cotoneaster-cochleatus available at https://www.99roots.com/en/plants/cotoneaster-cochleatus-p36852
29. Cotoneaster-glacialis available at www.findplants.co.uk/plant-cotoneaster-glacialis
30. Journal of medicinal plants research 5(8) 18 april 2011 available at www.academicjournals.org/journal/JMPR/edition/18_April_2011
31. Evergreen shrub cotoneaster available at http://www.summerhillgardencentre.co.uk/evergreen-shrub-cotoneaster/
32. Naturalist : Rockspray cotoneaster available at https://www.inaturalist.org/observations/101264333. available at cdn.intechopen.com/pdfs/34001.pdf
34. Invasive Plants of Asian Origin Established in the United States and Their Natural Enemies Volume 1 available at www.fs.fed.us/foresthealth/technology/pdfs/IPAOV1ed2.pdf
35. Carla Cassaniti , Daniela Romano and Timothy J. Flowers: The Response of Ornamental Plants to Saline Irrigation Water : pg no. 131-158 www.cdn.intechopen.com/pdfs/34001.pdf.
36. A study of cyanogenetic content and toxicity of selected species cotoneaster economic botany [vol 24 no.1] jan to march 1970
37. http://nutritional metabolism.biomed central.com/articles/10.1186/s129-015-0057-7
38. Cyanogenic glycosides-in plants :Botonical online available at https://www.botanical-online.com/english/cyanogenicglycosides.htm
39 .http://nutritional metabolism.biomed central.com/articles/10.1186/s129-015-0057-7 40. Ioannou Irina and Ghoul Mohamed biological activities and effects of food processing on flavonoids as phenolic anti oxidants: January 20th 2012. https://www.intechopen.com/books/advances-in-applied-biotechnology/biological-activities-and-effects-of-food-processing-on-flavonoids-as-phenolic-antioxidants