*CIBTech Journal of Biotechnology ISSN: 2319–3859 (Online)*
*An Open Access, Online International Journal Available at http://www.cibtech.org/cjb.htm*
*2017 Vol. 6 (1) January-March, pp.12-14/Anitha*
***Review Article***

# *CARALLUMA UMBELLATA* HAW-REVIEW ON THE COMPLETE CHEMICAL AND MICROPROPAGATION WORK

***Anitha S.**
*Department of Biotechnology, Sri Krishnadevaraya University,*
*Anantapur-515 001, Andhra Pradesh, India*
**Author for Correspondence*

**ABSTRACT**
*Caralluma umbellata* Haw. belonging to Asclepiadaceae family is a succulent thorny perennial herb. It is distributed in Orissa, Karnataka, Andhra Pradesh and Tamil Nadu hilly regions of India. In the present investigation a complete review of the chemical work, pharmacological evidence work carried out by different researchers were presented. Only one micropropagation work was carried in the plant. So the present review will be of great help for the further research studies which others could take up and continue.

***Keywords:*** *Micropropagation, Caralluma umbellata*

## INTRODUCTION

Diverse climatic conditions that exists in India made this country a hot spot of medicinal plants. Tribal of any country depend on this rich diversified plant sources for their medical aid. Many of these plants are now components of different systems of medicines as Unani, Siddha and Ayurveda (Negi *et al.,* 2002). Adverse side effects of synthetic medicines are pushing the world to look for the plant based drugs (Baris *et al.,* 2006). *Caralluma* genus is widely distributed in Asian countries, Africa and Southeast Europe. Among 12 species of *Caralluma* 11 are found in South India (Jagatap and Singh, 1999). The phytochemicals present in these plants gives immense importance to these species. Species present in this genus are having applications in the traditional medicines and is used for treating diabetes, cancer, scorpion and snake bites, skin diseases, inflammations, fever and tuberculosis (Qui *et al.,* 1997; Ramesh *et al.,* 1998).

*Caralluma umbellata* Haw. belongs to Asclepiadaceae family. It is a succulent thorny perennial herb growing upto 70cm. It is having applications in the traditional medicines and is used for treating diabetes, cancer, scorpion and snake bites, skin diseases, Stomach disorders, inflammations, obesity, fever and tuberculosis (Sravan *et al.,* 2010; Karuppusamy *et al.,* 2013). Main phytochemicals present in *Caralluma umbellata* are carumbellosides, Flavone glycoside, Steroidal glycosides, Glucopyranosides, and phenolic substances (Qui *et al.,* 1997; Ramesh *et al.,* 1999a & b). They were found to show anti-inflammatory, hypoglycaemic, Antimicrobial, antioxidant properties, anti-obesity, Hypocholesterolaemic, anti-androgenic, anticancer, antieczemic, antiarthritic, anticoroanry, insectifuge and antinociceptive (Kunert *et al.,* 2009; Kishore *et al.,* 2010; Ray *et al.,* 2011; Jeyakumar *et al.,* 2013; Kalyani *et al.,* 2013). For example, Glycosides are found to have anti-obesity nature and β-sitosterols were found to have anticancer effects.

Lin *et al.,* (1994) for the first time reported 2 new pregnane glycosides and named them as carumbelloside I and II and their structures were elucidated by NMR. Qiu *et al.,* (1997) isolated and reported three new C-21 steroidal glycosides (carumellosides III-V) elucidated by NMR spectroscopic studies. Ramesh *et al.,* (1999a) isolated flavones glycosides from three *Caralluma* species, in which *C. umbellata* is one. Ramesh *et al.,* (1999b) have reported isolation of novel pregnane glycoside and named it as carumelloside–I (3-*O*-β-D-glucopyranosyl-(1→6)-β-D-glucopyranosyl-3β,14β-dihydroxypregn-5-en-20-one). They have evaluated Carumbelloside-I for both anticocieptive and anti-inflammatory activities. They used mice and done writhing test method (anticocieptive) and paw edema test with carrageenan (anti-inflammatory).

Finally, they have reported significant antinociceptive action. Kishore *et al.*, (2010) reported two new pregnane compounds 3b-hydroxy-pregn-5-ene (CRUR I) and 3b,14 b-dihydroxy pregn-5-ene (CRUR II). They have isolated these compounds for the roots and elucidated these using spectroscopic studies like MS, NMR, IR, $H^1$ and $C^{13}$.

Ray *et al.*, (2012) isolated novel C-21 Steroidal glycoside and named it as Carumbelloside-IV. They have tested this compound for the anti-inflammatory activity using wistar rats and carrageenan induced paw edema method and confirmed the anti-inflammatory activity in this plant. Shanmugam *et al.*, (2013) used ethanolic extract of *C. umbellata* Haw. and tested against the hepatic damage induced rats and reported that ethanolic extract has prevented both serum biochemical and tissue antioxidant evidence of rat hepatic damage. Bellamakondi *et al.*, (2014) has attempted to check the anti-hyperglycaemic activity of *C. umbellata*, and reported a promising role in the inhibition of alpha amylase and pancreatic lipases. They used rat myotubes and methanolic extract.

An effective micropropagation protocol was presented by Susheela *et al.*, (2016). They have washed the nodal segments with Tween 20 (5%) for 5 min and then surface sterilized with mercuric chloride ( $HgCl_2$) (0.1% w/v) for 5 min. Later washed thoroughly with sterilized distill water. They have used MS (Murashige and Skoog, 1962) medium supplemented with 30g/l sucrose and 0.8% agar supplemented with different plant growth hormones. Among all the tested concentrations of cytokinins like, BAP (6-benzylaminopurine), Kin (Kinetin), 2ip (2-isopentenyl adenine) and TDZ (Thiadiazuron), BAP (2mg/l) was found to be best. The number of shoots produced were 4.6±0.18 per explants with mean shoot length of 2.32±0.02. Then they have tested the effect of other cytokinins (Kin, TDZ, 2iP (0.5-5mg/l)) in addition to BAP (2mg/l) and found the combination of TDZ (1mg/l) more effective. The number of shoots produced with this combination were 3.9±0.16 and a average shoot length of 2.04±0.05cm. These shoots were later placed for rooting containing both full strength and half strength MS medium supplemented with IAA (Indole- 3- acetic acid), IBA (Indole-3-butyric acid) and NAA (Naphthalene Acetic Acid). Half strength MS medium supplemented with NAA (0.1mg/l) was found to be more effective.

For acclimatization, rooted shoots were washed thoroughly and placed in pots containing a mixture of sand: Soilrite: garden soil which was sterilized in a ratio of 1:2:1. Potted plants were covered with polyethylene bags and humidity was maintained. These pots were first placed in culture room and relative humidity was maintained at 90-95%. After 15 days they removed covers and exposed to less conditions of humidity. Pots were later transferred to greenhouse and shifted to field. They have reported successful survival rate after transferred to the field one month later (73%).

## REFERENCES

**Bariş Ö, Güllüce M, Şahin F, Özer H, Kiliç H, Özkan H, *et al.*, (2006).** Biological activities of the essential oil and methanol extract of *Achillea biebersteinii* Afan. (Asteraceae). *Turkish Journal of Biology* **30** 65-73.

**Bellamakondi PK, Godavarthi A, Ibrahim M (2014).** Anti-hyperglycemic activity of *Caralluma umbellata* Haw. *BioImpacts* **4** 113-116.

**Jagatap AP, Singh NP (1999).** Fascicles of Flora of India. Fascicle 24. New Delhi: Botanical Survey of India 1999.

**Jeyakumar JJ, Kamaraj M, Nandagopalan V, Anburaja V, Thiruvengadam M (2013).** Study of phytochemical constituents in *Caralluma Umbellata* by GC-MS analysis. *International Journal of Pharmaceutical Science Invention* 2 37–41.

**Kalyani K, Anuradha K, Jayalakshmi G (2013).** A novel pregnane glycosidefrom the *Caralluma Umbellata* Haw (*Asclepiadaceae*) roots. *Journal of Natural Sciences Research* **3** 55–61.

**Karuppusamy S, Ugraiah A, Pullaiah T (2013).** *Caralluma* (*sensu lato*)–Antiobesity plants. Regency Publications, New Delhi; 2013.

**Kishore M, Surendrababu K, Hanumantharao Y, Bindu G, Janardhan M (2010).** Chemical examination of medicinal plant *Caralluma umbellate* (Asclepiadaceae) roots. *International Journal of Applied Biology and Pharmaceutical Technology* **1** 545.

**Kunert O, Simic N, Ravinder E, Rao BVA, Kumar BR, Alex RM, Rao AVNA (2009).** Steroidal glycosides from *Caralluma umbellata*. *Phytochemistry Letters* **2** 134-138.

**Lin LJ, Lin LZ, Gil RR, Cordell GA, Ramesh M (1994).** Pregnane glycosides from *Caralluma umbellata*. *Phytochemistry* **35** 1549-53.

**Murashige T, Skoog F (1962).** A revised medium for rapid growth and bioassays with tobacco tissue cultures. *Physiologia Plantarum* **15** 473–497.

**Negi CS, Nautiyal S, Dasila L, Rao KS, Maikhuri RK (2002).** Ethnomedicinal plant uses in a small tribal community in a part of central Himalaya, India. *Journal of Human Ecology* **1** 23-31.

**Qiu SX, Lin LZ, Cordell GA, Ramesh M, Kumar BR, Radhakrishna M, Mohan GK, Reddy BM, Rao YN, Srinivas B, Thomas NS (1997).** Acylated C-21 steroidal bisdesmosidic glycosides from *Caraluma umbellata*. *Phytochemistry* **46** 333-40.

**Ramesh M, Rao YN, Kumar MR, Mohan GK, Kumar BR, Rao AVNA, Krishna MR, Reddy BM (1999a).** Flavone glycoside from three *Caralluma* species. *Biochemical Systematic and Ecology* **27** 85-86.

**Ramesh M, Rao YN, Kumar MR, Rao AVNA, Reddy BM (1999b).** Antinocieptive and anti-inflammatory activity of carumbelloside-I isolated from *Caralluma umbellata*. *Journal of Ethnopharmacology* **68** 349-352.

**Ramesh M, Rao YN, Rao AV, Prabhakar MC, Rao CS, Muralidhar N, Reddy BM (1998).** Antinociceptive and anti-inflammatory activity of a flavonoid isolated from *Caralluma attenuata*. *Journal of Ethnopharmacology* **62** 63–66.

**Ray S, Nagaiah K, Khan NF (2011).** Anti-inflammatory activity of Carumbelloside-III, isolated from *Caralluma umbellata*. *Journal of Pharmacy and Healthcare Management* **2** 83–88.

**Ray S, NagaiahK, Khan NF (2012).** A study of anti-inflammatory activity of one novel C-21 steroidal glycoside known as Carumbelloside-IV isolated from *Caralluma umbellata*. Journal of Pharmaceutical Science and Technology **1** 12-14.

**Shanmugam G, Mahes A, Rao DMR, Devarajan T (2013).** Hepatoprotective effect of *Caralluma umbellata* against acetaminophen induced oxidative stress and liver damage in rat. Journal of Pharmacy Research **6** 342-345.

**Susheela B, Rani SS, Pullaiah T (2016).** Effect of cytokinins on in vitro propagation of *Boucerosia umbellata* (Haw.) wight & Arn. (Syn.: *Caralluma umbellata* Haw.) from nodal explants of field grown plants. *British Biotechnology Journal* **12** 1-11.