J. Phytol. Res. **33**(2):189- 194, 2020 **ISSN 0970-5767**

ANTIBACTERIAL ANALYSIS OF *CAPPARIS DECIDUA*

SEEMA VYAS*, MOOL CHAND MALI and NARENDAR BHOJAK[1]
Department of Chemistry, Govt. Dungar College, Bikaner 334001, India
[1]P.G. Department of Botany, Govt. Dungar College, Bikaner 334001, India
*Corresponding Author's EMail: saurs.seema@gmail.com

Present study was carried out to analyze antibacterial activity of different parts of *Capparis decidua,* for this root, stem, fruits and whole plant were collected and extracted with different solvents such as water, alcohol and petroleum ether, antibacterial activity of these extracts were determined by disc diffusion method against *E. coli, Staphylococcus aureus* and *Bacillus subtilis,* during this work maximum antibacterial activity against *E. coli* was reported in two extracts (i) *Capparis* whole plant with Micellar media-petroleum ether-alcohol extract (ii) *Capparis* root with water extract, and against *Staphylococcus aureus* maximum antibacterial activity was reported in *Capparis* stem extract with water-petroleum ether-alcohol extract, and *Capparis* root with micellar media extract have maximum antibacterial activity against *Bacillus subtilis.*

Keywords: Antibacterial activity,*Capparis decidua,* Disc diffusion method.

Introduction -

Capparis decidua is a xerophytic shrub that widely grows in the western parts of India. It is an indigenous medicinal plant commonly known as 'Kair' in Hindi, belongs to family Capparidaceae. It is a dominating shrub found in desert region of Rajasthan having strong climatic adaptations. Plant is bushy densely branched, thorny shrub possesses smaller scanty and caduceus leaves, pink to red flowers and green berry fruits in pre-monsoon period[1,2]. *Capparis decidua* is a multipurpose plant that is used as vegetable, fruits, fire wood and aesthetic purposes[3]. *Capparis decidua* was analyzed ecologically, taxonomically and with its medicinal properties by Aziz khan *et al.* and told that *Capparis* is useful in various aspects as in food, medicine, fuel and helpful in pollution control[4]. Plant is used in traditional folk medicine as ailments to relieve variety of pains or aches such as toothache, cough and asthma healer. This have carminative, aphrodisiac, appetizer, emmenagogue, alexipharmic properties and helpful in lumbago, rheumatism and hiccup[5]. Insecticidal and oviposition inhibition action of *Capparis decidua* against store grain insect pest were also reported[6]. *Capparis* also have anti asthmatic properties[7]. Nutritional composition, Phytochemicals and antioxidant activities of *Capparis* were analyzed by Gupta *et al.* and told that fruits of *Capparis* are rich in protein and carbohydrates[8]. Oil content of *Capparis* seeds is 63.75% and transesterified extract may be use as biodiesel with its high yield[9]. According Vaishnav *et al.* all aerial parts of *Capparis* are rich in amino acids, fatty acids, tocopherols, sterols, glucosinolate and phenolics. The stems of kair shrubs have cytotoxic activities. Stem, fruits and flowers contains N-triacontanol, water soluble Stachydrine (2-Carboxy-1, 1-dimethyl Pyrrolidine), Npentacosane, β-Sitosterol and β-Carotene and hydrocarbons Nonacosane and Triacontane. The stem possesses antihelmintic activity, hepatoprotectiveactivity12, antidiabetic activity, hypolipidemic activity. Flowers and fruits are sedative and anticonvulsant, Flowers are anti-erosclerotic and anti-

inflammatory, unripe fruits used in hypercholesterolemia[10]. Tehseen *et al.* told that fruits and flowers of *Capparis* contain mainly protein and stem bark and root are rich in fiber. Mineral content was high in fruits and flowers comparative to other parts; hence flowers and fruits may be a viable source of minerals and vegetable protein both for human beings and livestock to supplement nutrition[11]. Siddiqui *et al.* reported a novel compound from *Capparis* germacr-3β-ol-7, 9-dien-6,14-olide-15-oic acid along with several known Compounds[12]. Muhammad *et al.* improve the germination traits of *C. decidua* by different pre-sowing seed treatment by using kinetin and PEG and told that calcium and potasium content can be improve by seed priming with kinetin and ascorbic acid[13]. Verma *et al.* reported various compounds from C*apparis* especially spermidine alkaloids, glucosinolates and other glycosides, β-sitosterol, rutin, l-stachydrine, hydrocarbons and terpenolides[14].

Materials and Method:-

Collection of material:

Material was collected from Shivbari area, Bikaner. Root, stem of *Capparis* were collected, fruits were collected in its flowering season March- April. For this area was visited for three to four times, flowers were present in March – April, fruits were collected in April last.

Moisture content determination:

For present work fruits, stem and root were collected in air tight container from Shivbari area Bikaner. Moisture content of different parts as stem, fruits, root and whole plant of *Capparis decidua* was find out as follow:

i. Samples of all above parts were collected.

ii. Collected material was weigh in GCRC laboratory by Digital weighing machine, and wet weight (W_1) was noted of each sample.

iii. Now the samples were dried in shadow for twenty days.

iv. After shadow drying, each sample was weighted again, and final weight (W_2) was noted.

v. Moisture content(MC) of each sample was find by :

$MC = W_1 - W_2/W_1 * 100$

MC = Moisture content

W_1 = Wet weight of sample

W_2 = Dry weight of sample

Preparation of extracts:

After moisture content determination each dried sample was powdered by mechanical grinder in GCRC laboratory. Then extraction of each sample was done by soxhlet method, in two secries 1. Water series 2. Micellar media series. There were three steps in each series. 5 gm of each sample was extracted successively with water, petroleum ether and alcohol in water series and other 5 gm of each sample was extracted successively with 1% Triton-x-100 Micellar media, petroleum ether and alcohol in Micellar media series for 6 hours. 120 ml. of solvent was taken in each extraction. Six extracts of each sample were obtained. Total twenty four extracts were obtained. Extracts from each step was measured and collected in glass bottles for further analysis.

Antibacterial activity:

Anti bacterial study of each extract was determined by disc diffusion method. Bhojak *et al.* reported antibacterial activity of few complexes of Mn (II) with amide group containing legands[15]. Yadav and Bhojak reported antibacterial activity of few complexes of Mn (II) with amide group containing legands[16]. Antibacterial activity was done by disc diffusion method against Gram positive and gram negative bacteria such as *Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis.* These were collected from the Department of Microbiology, S. P. Medical College, Bikaner. Nutrient agar media was used for bacterial culture. Agar media, broth, all the instruments and other things used in this method were sterilized in autoclave for 45 min. After a little cooling of the medium

was poured in petri-dish. The plates kept at room temperature for solidification and stored at 4 ^{0}C until using. Bacterial culture was spread over the nutrient agar plates by using separate sterile spreader. Disc from Whatman paper of 4 mm. diameters was made, dipped in sample and placed on plates coated with bacterial culture of *E.coli, Staphylococcus aureus* and *Bacillus subtilis.* The plates were incubated for 24 hours at 37°C. The antibacterial activity of each extract was recorded based on the inhibition of bacterial growth by the extract at the end of incubation period. At the end of the incubation period the zones of inhibition was measured for each disc, in millimeter. Zone of Inhibition, is opaque area around the disc where bacterial growth was inhibited by sample, which was applied to disc, there is no growth of inoculated microorganism in zone of inhibition, large zone of inhibition shows high antibacterial strength.

Results and Discussion

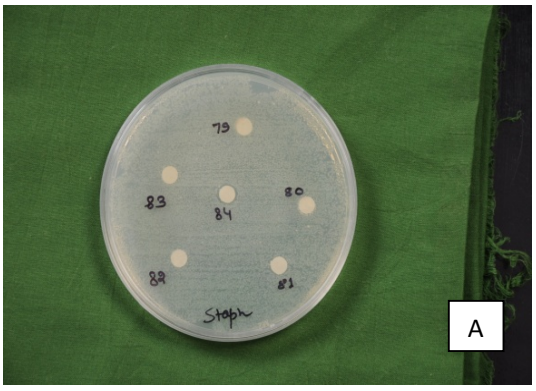
Moistute contents of different parts of *Capparis* was estimated and it was observed that seeds have maximum moisture contents (Table 1).

S. No.	Name of Sample	Initial weight (W_1) gm	Final weight (W_2) gm	Moisture content (%) $=W_1-W_2/W_1*100$
1	*Capparis* stem	1880	1300	30.85%
2	*Capparis* fruit	59.76	23.03	61.46%
3	*Capparis* root	2528	1986	21.43%
4	*Capparis* whole plant	4467.76	3309.03	25.91%

Table 1. Moistute contents of different parts of *Capparis*

Results of antibacterial study were measured by zone of inhibition, this is an opaque region around the disc where applied sample inhibit to grow bacteria, measured in millimeters called as zone of inhibition, high value of shoes high antibacterial activity of related sample. (Fig. 1 A-E) Results of anti bacterial study are presented in Table 2.

The present study told that different parts of *Capparis* have different antibacterial activity among which *Capparis* whole plant with micellar media-petroleum ether-alcohol and *Capparis* root with water have maximum antibacterial activity against *E. coli* and *Capparis* stem with water-petroleum ether-alcohol extract have maximum antibacterial activity against *Staphylococcous aureus* where as *Capparis* root with micellar media extract have maximum antibacterial against *Bacillus sublitis*. Hence on the basis of results it prove that *Capparis* have significant antibacterial activity and useful against pathogenic bacteria. There are some previous studies in which antibacterial activity of *Capparis decidua* was reported[17]. Antifungal activity of *Capparis* was also reported[18]. Antibacterial activity of chloroform, petroleum ether, ethanol and water extracts of *Capparis decidua* were calculated against gram positive bacteria (*Staphlococcous aureus* and *Bacillus sublitis*) and gram negative bacteria (*Escherichia coli* and *Pseudomonas aeurogenosa*) and told that different extracts shown significant antibacterial activity against selected bacteria[19]. Methanolic, ethanolic and acetone extracts of bark, shoot, fruits, flowers and root of *Capparis* were used against *Staphylococcus aureus*, *Escherichia coli*, *Bacillus subtilis* and *Pasteurella multocida.* And told that it have significant antibacterial activity[20].



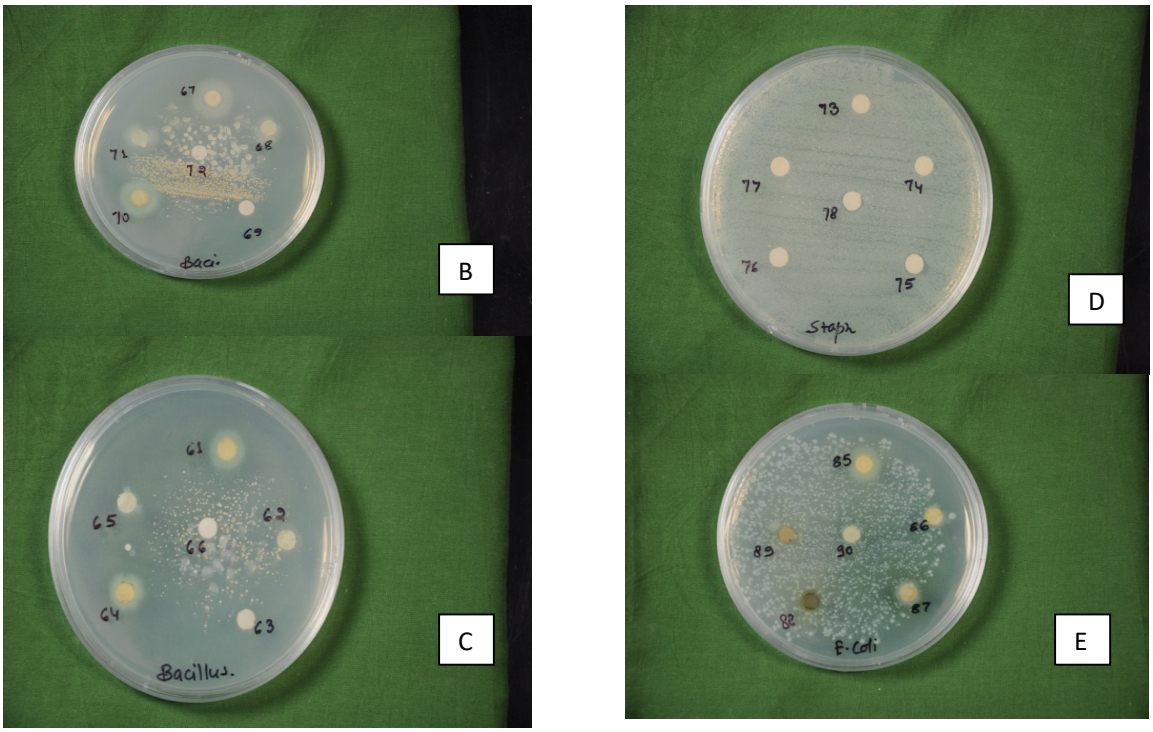


Fig: 1(A-E): Antibacterial activity of different extracts of *Capparis decidua*

		Zone of inhibition (mm)		
S.No.	**Name of sample (extract)**	***E. coli* (mm)**	***Staphylococcus aureus* (mm)**	***Bacillus subtilis* (mm)**
1.	*Capparis* stem with water	Nil	Nil	10.5
2.	*Capparis* stem with Water- petroleum ether	Nil	Nil	7.0
3.	*Capparis* stem with water-petroleum ether-alcohol	6.0	10.0	Nil
4.	*Capparis* stem with micellar media	10.0	Nil	11.0
5.	*Capparis* stem with micellar media-petroleum ether	Nil	6.0	Nil
6.	*Capparis* stem with micellar media-petroleum ether-alcohol	Nil	7.0	8.0
7.	*Capparis* root with water	11.0	6.5	14.0
8.	*Capparis* root with Water- petroleum ether	Nil	6.0	12.0
9.	*Capparis* root with water-petroleum ether-alcohol	9.0	7.5	Nil

10.	*Capparis* root with micellar media	Nil	Nil	16.0
11.	*Capparis* root with micellar media-petroleum ether	Nil	Nil	11.0
12.	*Capparis* root with micellar media-petroleum ether-alcohol	9.0	7.0	8.0
13.	*Capparis* fruits with water	Nil	Nil	Nil
14.	*Capparis* fruits with Water- petroleum ether	Nil	5.5	Nil
15.	*Capparis* fruits with water-petroleum ether-alcohol	6.5	8.0	Nil
16.	*Capparis* fruits plant with micellar media	Nil	5.5	10.0
17.	*Capparis* fruits with micellar media-petroleum ether	Nil	5.6	Nil
18.	*Capparis* fruits with micellar media-petroleum ether-alcohol	Nil	7.0	Nil
19.	*Capparis* whole plant with water	Nil	Nil	12.0
20.	*Capparis* whole plant with water-petroleum ether	Nil	5.5	Nil
21.	*Capparis* whole plant with water-petroleum ether-alcohol	7.5	8.5	Nil
22.	*Capparis* whole plant with miceller media	Nil	Nil	Nil
23.	*Capparis* whole plant with micellar media-petroleum ether	6.0	Nil	10.0
24.	*Capparis* whole plant with micellar media-petroleum ether-alcohol	11.0	6.0	8.0

Table 2: Results of Antibacterial study

Reference:

1. Shetty B V and Singh V 1987. Flora of Rajasthan. Botanical Survey of India.
2. Bhandari M M 1990. Flora of Indian Desert. MPS Repros.
3. Verma V 2009. Text book of Economic Botany. Ane books Pvt. Limt.
4. Khan A, Sultan M S, khan R U and khan S U 2013. Ecological, Taxonomical and Ethenobotanical Study of Wild Fruit Producing Xerophytes of District Bannu. *Journal of Medicinal Plants Studies.* 1 **4** 112-120.

5. Vyas S, Mali M C, Verma S K and Bhojak N 2017. Medicinal plants of Rajasthan: A Review. *International Journal of Green and Herbal Chemistry.* 6 **4** 117-143.
6. Upadhyay R K 2012. Insecticidal and oviposition inhibition efficacy of *Capparis decidua* to *Sitophilus oryzae* Linn. (Coleoptera: Curculionidae). *International Journal of Chemical and Biochemical Sciences.* **2** 14-23.
7. Saluja P K, Shukla K & Yadav H 2015. Anti-Arthritic Activity of Ethano-Medicinal Herbal Plants**.** *Journal of Environmental Science, Toxicology and Food Technology.* 1 **5** 12-23.
8. Mann S, Chaudhary I and Gupta R K 2013. Value addition scenario of arid foods of desert area and evaluation of their nutritional and phytochemical potential. *International Journal of Pharmacy & Life science.* 1 **5** 2335-2339.
9. Pokharkar D R, Funde E P, Joshi S S and Pingale S S 2008. Synthesis and Characterization of Fatty Acid Methyl Ester by In-Situ Transesterification in *Capparis Deciduas* Seed. *Leonardo Electronic Journal of Practices and Technologies.* **13** 2-18.
10. Vaishnav R, Agrawal R D and Sharma S 2015. Medicinal Value and Future Perspective of Some Therapeutically Important Plants from Indian Western Region. *Int. J. Pharm. Sci. Rev. Res.* 34 **1** 88-93.
11. Tehseen G, Mahmood Z, Faeooq, Sultana B, Nouman W, Shahid S A and Iqbal M Z 2015. Variation of proximate composition and minerals within different parts of *Capparis decidua* (FORSSK.) EDGEW. As a function of harvesting seasons. *Pak. J. Bot*. 47 **5** 1743-1748.
12. Mohammed M S, Khalid H S, Muddathir A K, Siddiqui N A and Ali M 2012. A Novel Germacranolide Sesquiterpene Lactonewith Anti-inflammatory effect from *Capparis decidua* (FORSK.). *International Journal of Research in Pharmacy and Chemistry.* 2 **4** 1073-1077.
13. Y, Wasif N, Muhammad Z, Syed A M and Irfan A 2016; Seed priming improves emergence potential, growth behaviour and nutritional quality of *Capparis decidua* (Forssk.) Edgew. under Drought Stress. *Pakistan Journal of Life and Social Sciences*. 14 **3** 135-143.
14. Verma P D, Dangar R D, Suhagia B N Shah k n, Gandhi D M 2011; Pharmacognostical Potential of *Capparis deciduas* Edgew**.** *Journal of Applied Pharmaceutical Science.* 01 **10** 06-11.
15. Bhojak N, Gudasaria DD, Khiwani N and Jain R 2007. Microwave assisted synthesis spectral and antibacterial investigations on complexes of Mn (II) with amide containing ligands. *Journal of Chemistry*. 4 **2** 232-237.
16. Yadav N and Bhojak N 2013; Microwave assisted synthesis, spectral and antibacterial investigation on Co (II) complexes with amide ligands. *The Int J Eng Sci.* 2 **2** 166-168.
17. Singh P, Mishra G, Sangeeta, Shrivastava S, Jha KK and Khosl R K 2011; Traditional uses, phytochemistry and pharmacological properties of Capparis deciduas: An overview. *Scholar research library*. 3 **2** 71-82.
18. Tripathi Y C, Singh S, Anjum N and Srivastava K K 2015; Antifungal activity of *Capparis decidua* extracts against seed borne pathogenic fungi. World journal pharmacy and pharmaceutical sciences. 4 **10** 1500-1512.
19. Ishtiaq M, Nazeer S, Maqbool M, Azam A, Kanwal A and zaib M 2017; Antibacterial and anatomical study of Capparis decidua L. from different locality of district Bhimber Azad, Jammu and Kashmir, Pakistan. The pharmaceutical and chemical journal. 4 **2** 24-28.
20. Gull T, Sultana B, Ahmad I, Bhatti I A and Jamil A 2015; Antibacterial potential Capparis spinosa and Capparis decidua extracts. Int.journal of agri bio17727-733.