

Phytochemical Estimation of Ethno-Medicinal Plant of *Solanum xanthocarpum* (L.) of Dang Area of Dholpur District, Rajasthan (India)

Dr. Manoj Kumar Meena,
Assistant Professor,
Department of Botany,
M.S.J. Govt. PG College, Bharatpur, Rajasthan (India)

Abstract:- The present work was undertaken to analysis of the phytochemical compounds present in the fruit of ethnomedicinal plant of *Solanum xanthocarpum* (L.) belonging to the solanaceae family in dang area of Dholpur district of Rajasthan. Ethnomedicinal plants have bioactive compounds such as alkaloids, flavonoids, steroids and phenols which are used to curative various human ailments and also play an important role in healing.

Keywords:- Ethnomedicinal, Phytochemicals, Bioactive, Analysis, Alkaloids.

I. INTRODUCTION

The primary book on ethnobotany in our country was published in 1981 under the title "Glimpses of Indian Ethnobotany" edited by Jain (1981). Jain (1964, 1967, 1987) wrote about the scope and importance of ethnobotany for the improvement of food plants, development of new drugs widening the use of little known plants and conservation of plant multiplicity. The ethnomedicinal plants are useful for therapeutic as well as for curing of human diseases because of the existence of phytochemical compounds. Phytochemicals are naturally stirring in the medicinal plants, leaves, vegetables and roots that have protection mechanism and protect from various diseases. Mainly phytochemicals are two types - primary and secondary compounds. Chlorophyll, proteins and common sugars are incorporated in primary constituents and secondary compounds have terpenoid, alkaloids and phenolic compounds. Terpenoids show confirmation of various vital pharmacological activities i.e. anti-inflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities. Alkaloids used as anesthetic agents are found in medicinal plants. Plant chemicals are regarded as secondary metabolites because the plants that manufacture them may have little need for them. They are synthesized in all parts of the plant body like bark, leaves, stem, root, flower, fruits, seeds etc. Currently, the global demand of herbal medicines is increasing rapidly because of their higher safety margin and low cost.

The current study exposed the qualitative phytochemistry of medicinal plant used by the peoples of Dholpur district, Rajasthan in curing dreadful ailments of human on one hand and cattle on the other hand.

➤ Study Area -

Dang area is one of the most resource dispossessed and arid region of Rajasthan state marked with degraded ravines, barren land and severe water shortage. Dholpur district with an area of 3034 square kilometers is located in eastern most extremity of the state of Rajasthan and lies between latitudes 22°21'19" and 26°57'33" North and longitude 77°13'06" and 78°16'45" East.

II. MATERIAL AND METHODS

➤ Gathering of Plant Materials

Plant materials Fruits were collected from Dang area of Dholpur, District, Rajasthan, India.

- The plant life were identified by villagers of tribal local communities about various aspects.
- Interviewing with regular people to know about ethnomedicine and plants used for treating diseases in cattle.

➤ Preparation of Plant Extract

Collected plant materials like leaf, stem, root, pods and fruits were washed with distilled water and shade dried for a week. The dried sample were manually ground to fine powder using pulverizer and passed through 40 mesh sieve and stored in air tight containers. The plant powder was taken in a test tube and distilled water was added to it such that plant powder saturated in it and shaken well. The solution was then filtered with the help of filter paper and filtered extract of the plant samples were taken and used for further phytochemical analysis.

• Flavonoids Shinoda's Test:

1ml of herbal extract was treated with few Mg turnings and a few drops of conc. HCl. Formation of pink / green color indicated the presence of flavonoids.

• *Dragendroff's Test for Alkaloids:*

2 ml of HCl was added to 0.5 ml of herbal extract followed by 1 ml of reagent. An orange red precipitate formation indicates the presence of alkaloids.

• *FeCl₃ Test for Tannins:*

Few drops of FeCl₃ solution were added to 1ml of herbal extract. configuration of blue or green color indicated the presence of tannins.

III. RESULT AND DISCUSSION



Fig 1 *Solanum xanthocarpum* (L.)



Fig 2 Interactions with Different Tribal Communities of Dang Area of Dholpur District, Rajasthan.

➤ *Medicinal Properties -*

Solanum xanthocarpum is useful in bronchial asthma, hairfall, curing dropsy, leprosy, cough, chest pain, stopping vomiting, skin disease and itching. This herb is also used in wound healing and cardiac disease. These plants have been used in veterinary treatment. The entire plant decoction is used as herbal drug to treat gonorrhoea and also used as pest control and molluscicide. Leaf paste is used as pain-killer and roots acts as expectorant and diuretic, useful in the treatment of cataract fever, chest pain and coughs. Its seeds are given as a remedy to asthma and cough. Fruits are effective to cure

throat infections, rheumatism, indigestion, diabetes and other inflammatory diseases. Fruit is anthelmintic drug. Fruits stem and flowers are good medicine to get relief from the burning sensation in feet, as well as it has cardiotoxic, cytotoxic, hypotensive, anti-anaphylactic, anti-tumor and anti-spasmodic properties.

➤ *Phytochemical Analysis -*

Some phytochemical compounds such as flavonoids, alkaloids, steroids, tannins, carbohydrate and phenol were analyzed from *Solanum xanthocarpum* fruit.

Table 1 Chromatographic and Physico-Chemical Characteristics of Isolated Flavonoids from Fruit of *Solanum xanthocarpum*

Isolated compounds	R _f value	Physical appearance			Color after spray
	S ₁	Daylight	Ammonia	I ₂ Vapor	R ₁ Visible
Kaempferol	0.85	Green-YW	BT-YW	Yellow- Brown	Brown
Luteolin	0.49	Green-YW	YW	Yellow- Brown	Brown

Here: S₁ – Benzene: acetic acid: water (125: 72: 3), R₁ – 5% FeCl₃ solution.

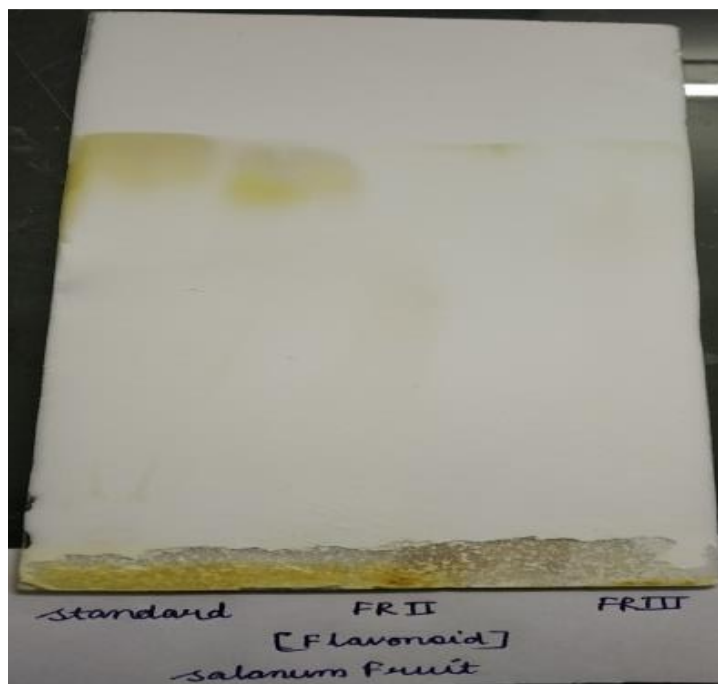


Fig 3 Chromatographic and Physico-Chemical Characteristics of Isolated Flavonoids from *Solanum xanthocarpum* Fruit

• *Alkaloids-*

In the present study, alkaloids extracts was applied on TLC plates separately and compared their color and R_f values with standards. Alkaloid estimation showed one spot of brick red color in FR II and FR III fractions and found that they were nearby values to R_f value of trigonelline compound.

Table 2 Chromatographic and Physico-chemical characteristics of isolated trigonelline

Isolated compounds	R _f value	In UV	Color after spraying and heating
	S ₁	R ₁	R ₂
Trigonelline	0.11	BT-BL	BK-RD

Abbreviations: S - Butanol: Acetone: Water (4:1:5), R₁-In UV, R₂-Dragendroff's reagent, BT - Bright, BL – Blue, BK- Brick, RD- Red.



Fig 4 Chromatographic and Physico-Chemical Characteristics of Isolated Alkaloid from *Solanum xanthocarpum*

• *Steroid-*

Saiyed and Kanga 1936 seclued the substance carpesterol along with a steroid. TLC analysis in *Solanum xanthocarpum* fruit part blue color was detected which is identified as Diosgenin and Tigogenin compound.

Table 3 Chromatographic and Physico-Chemical Characteristics of Isolated Steroid from Fruit of *Solanum xanthocarpum*

Isolated Compound	In UV	R _f Value	Color After Spray
		S ₁	R ₁
Diosgenin	BR-BL	0.62	GN
Tigogenin	BL	0.57	Orange

Abbreviations: S₁ - Chloroform:Hexane:Acetone (23: 5:2), R₁- 50% H₂SO₄, BL- Blue, BR-Bright, GN- Green.

• *Tannin content-*

The tannin content in *Solanum xanthocarpum* fruit was found 459.08 µg/g.

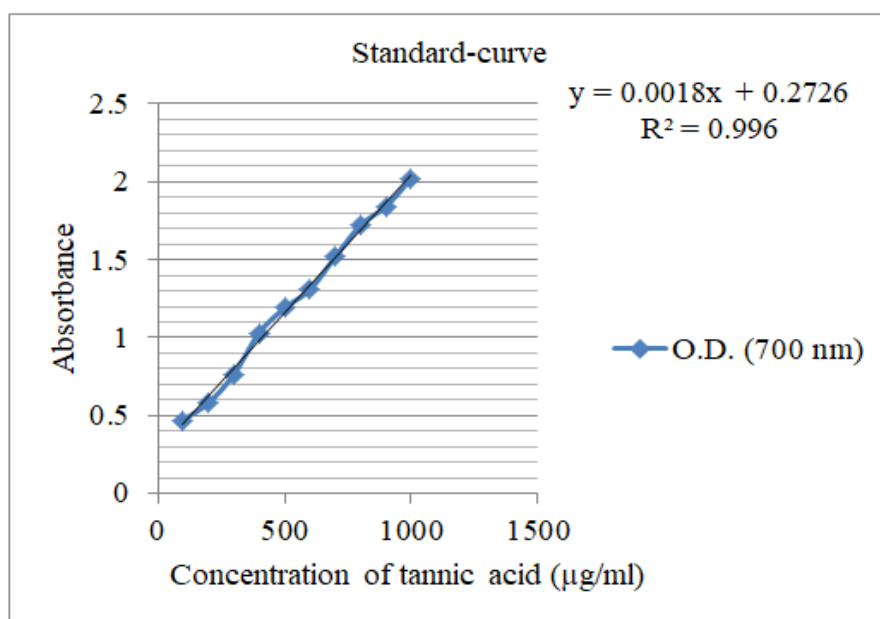


Fig 5 Standard curve of Tannin

• *Phenol Content-*

In *Solanum xanthocarpum* fruit 144.6µg/g phenol content was recognized.

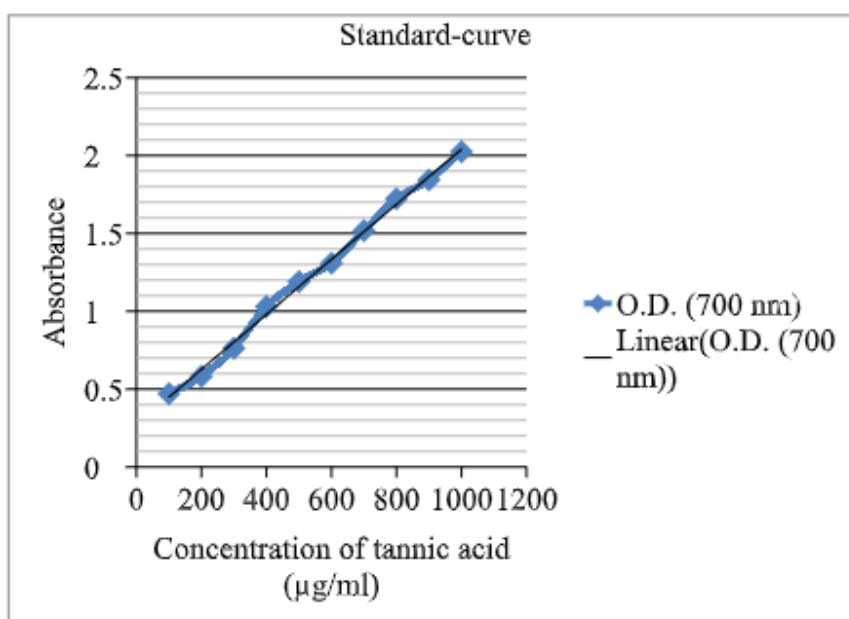


Fig 6 Standard curve of phenol

• *Antioxidant Activity-*

The results from phytochemical screening indicated that *S. xanthocarpum* fruit contain bioactive compounds such as tannin, carbohydrate, phenol and flavonoids all these bioactive compounds are responsible to exhibit medicinal values of plants such as antioxidant activity. Hence the antioxidant activity of these plant species had been determined. . Patel *et al.*, 2011 examined various solvent fractions of *Pedaliium murex* fruit part and reported the total phenol content and scavenging activity. Patel *et al.*, 2011 examined various solvent fractions of *Pedaliium murex* fruit

part and reported the total phenol content and scavenging activity

• *DPPH Activity-*

From the outcome it was evident that the plants showed good antioxidant activity with dose depended manner. Accordingly antioxidant activity was directly proportional to concentration of plant sample. *Solanum xanthocarpum* fruit part as shown in table. showed 53% DPPH inhibition activity at 100µl concentration.

Table 4 DPPH Activity of *Solanum xanthocarpum* Fruits

Sample Concentration	% DPPH inhibition activity
10µl	0.128±0.03
20µl	1.02±0.57
30µl	5.38±1.99
40µl	10±1.46
50µl	14.23±0.97
60µl	21.53±2.07
70µl	23.08±3.13
80µl	25.51±1.31
90µl	26.92±4.98
100µl	34.36±2.48

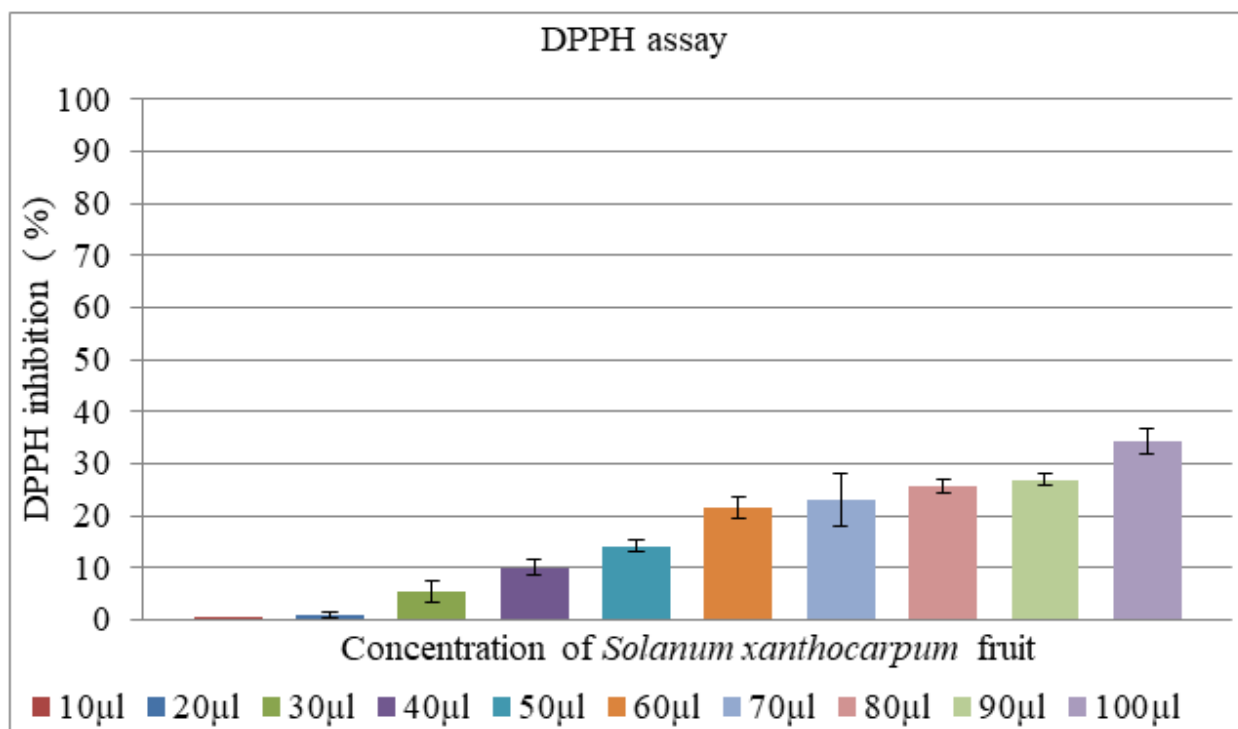


Fig 7 DPPH Activity of *Solanum xanthocarpum* Fruits

The current cram was undertaken to estimation the phytochemical compounds present in the leaf, stem and roots of medicinal plant of *Solanum xanthocarpum* in Dang area of Dholpur district. Following investigations of extracts from *Solanum xanthocarpum* showed the occurrence of diosgenin and β-sito-sterol. In the study Diosgenin and Tigogenin with green and orange color spots were found from *Solanum xanthocarpum*. Extracts were organized as of aqueous and organic solvent like Petroleum ether, Chloroform, Ethyl acetate and Ethanol. Remedial plants

have bioactive compounds which are used for remedial various human ailments and also play an vital role in healing. Analysis of the plants was performed using customary methods and resulted in the exposure of the presence of tannins, flavonoids, phenolics, saponins, steroids, and alkaloids. It is expected that the important phytochemical properties acknowledged in the present study in the indigenous medicinal plants of dang area of Dholpur will be positively helpful in the curing of different diseases of the region.

IV. CONCLUSION

Plants also have bioactive components which have medicinal properties (Shakya, 2016). The phytochemical study of *Solanum xanthocarpum* revealed valuable information about the chemicals present in the fruit parts of the plant. The various chemical tests showed the presence of Flavonoids, alkaloids, steroids, terpenoids and carbohydrates.

REFERENCES

- [1]. Adam, S.E., Al-Yahya, M.A. and Al-Farhan, A.H. 2001. Response of Najdi sheep to oral administration of *Solanum xanthocarpum* fruits, *Nerium oleander* leaves or their mixture. Small Ruminant Research. 40(3):239-44.
- [2]. Adeoti TK, Oyedapo (2012) Biochemical effects of saponins isolated from *Momordica charantia*. Med Chem & Drug Disc 3: 65-70. 35.
- [3]. Ambi, A.A., Abdurrahman, E.M., Sule, M.I., Pateh, U.U., Abdurrahman, Y.R. and Ibrahim, N.D.J. 2007. Phytochemical screening and histopathological studies on the seeds of *Colocynthis citrullus* in albino rats. J. Pharmaceutical Sciences. 6(2):7-12.
- [4]. Bhattacharyya, R., S. Bhattacharyya, & S. Chaudhuri. 2006. Conservation and documentation of the medicinal plant resources of India. Biodiversity and Conservation. 15:2705–2717.
- [5]. Jayaraman, R. and Christina, A.J.M. 2013. Evaluation of *Solanum xanthocarpum* fruits on in vitro antioxidant activity and in vivo DEN/PB induced hepatotoxicity. Int. J. Applied Res. in Nat Pro. 6(1):1-9.
- [6]. Jain S. and Mogra R. (2006). Analysis of Food and Components, Department of Food and Nutrition, Maharana Pratap University of Agricultural and Technology, Udaipur (Raj.), India.
- [7]. Joshi S. and Sharma M. (2013). Ethno-medicinal plants used in Birth Control by tribals of Kota region of Rajasthan”, Indian J. Applied & Pure Bio. 28(2). 237-243.
- [8]. Kapoor B. B. S. and Lakhera S.(2013). Ethnomedicinal plants of Jodhpur District, Rajasthan used in herbal and folk remedies. Indian J.Pharm.Biol.Res 1(4) 71-75.
- [9]. Katewa S.S. and Guri B.D. (1997). Ethnomedicinal observations on certain wild plants from southern Aravalli hills in Rajasthan, Vasundhara. pp. 85-88.
- [10]. Kumar, S., Kumar, D., Manjusha, D., Saroha, K., Singh, N. and Vashishta, B. 2008. Antioxidant and free radical scavenging potential of *Solanum xanthocarpum* (L.) Schrad. Methanolic fruit extract. Acta Pharm. 58:215-220.
- [11]. Maatooq, G.T., El-Sharkawy, S.H., Afifi, M.S. and Rosazza, J.P. 1997. C-hydroxy-benzoyl-glycoflavones from *Solanum xanthocarpum*. Phytochemistry. 44 (1):187-90.
- [12]. Mahendiaveria, C.P. (2007). Ethnobotanical and Pharmacognostical studies on Acanthaceae used in Ayurvedic system. Ph.D. Thesis, Department of Botany, Rajasthan University, Jaipur.
- [13]. Meena M.C., Kumar, V., Meena, R.K. and Khandelwal, S. (2014). Ethnomedicinal plants used by tribals in Pratapgarh, Rajasthan. WJPPS Vol 3(7):1009-1016.
- [14]. Murthy, H.N., Yadav, G.G. and Dewir, Y.H. 2021. Ibrahim Phytochemicals and Biological Activity of Desert Date (*Balanites aegyptiaca* (L.) Delile). Plants 2021, 10:32. Structural and Functional Analysis of Extracts in Plants. 415.
- [15]. Sharma, L. (2006) Ph.D thesis. University of Rajasthan. Ethnobotany of Dang region, Rajasthan, Jaipur.
- [16]. Othman, S.S., Hamad, G.M., Zaid Hassan, S.A., Fayad, E. and Ali, S.M. 2022. Preparation, Identification and Antioxidant Evaluation of *Solanum xanthocarpum* Root and Fruit Extracts against Doxorubicin in Male Rats. Online J. Biological Sciences. 22(1):75-86.
- [17]. Priyavardhini, S., Vasantha, K. and Umadevi, M. 2009. Antibacterial activity on *Solanum xanthocarpum* leaf extract. Ancient Science of Life. 29(1):12.
- [18]. Rodge, S.V. and Biradar, S.D. 2013. Preliminary phytochemical screening and antimicrobial activity of *Solanum xanthocarpum* (Linn.) Schard. Ind. J. Plant Sci. 2(1):19-23.
- [19]. Shekhawat D. and Batra A. (2011). Household Remedies of Nainwa Tehsil in Bundi District, Rajasthan. International Journal of Pharmaceutical Innovations 1(1).
- [20]. Sturm, S., Schneider, P., Seger, C. and Stuppner, H. 2009. Analysis of *Solanum xanthocarpum* cucurbitacine derivatives with HPLC-SPE-NMR. Scientia Pharmaceutica. 77(7):254.