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Phytochemical and UV spectrum Analysis of *Azadirachta indica*, *Calotropis gigantea*, and *Ricinus communis*

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Abstract
The objective of this study was to identify different phytochemicals present in aqueous leaf extracts of *Azadirachta indica* and *Ricinus communis*, aqueous flower extract of *Calotropis gigantea*. Aqueous extracts of these plants were prepared and subjected to qualitative phytochemical and UV spectrum analysis. The presence of various phytochemical compounds was determined using standard screening tests and the results indicated the presence of alkaloids, flavanoids, saponins, Terpenoides in all three plant extracts. Uv spectrum analysis of *A. indica*, *C. gigantea* and *R. communis* showed absorption maxima at 286, 271 and 281 nm, respectively.

Keywords: *A. indica, C. gigantea,* R. *communis*, Uv *spectrum*

1. Introduction
A. indica the member of Meliaceae family is one of the first medicinal plants used to treat diverse type of diseases like cancer, bile disorders, paralysis (Sandhir *et al.*, 2021) [13]. Quercetin and β-sitosterol are polyphenolic flavanoids which are known to have antifungal and antibacterial activity (Alzohairy 2016) [2]. *C. gigantea* belonging to family Ascelepidacea is commonly called as milk weed has numerous medicinal properties like anticancerous activity, antiasthamatic, antibacaterial, ovicidal, hepatoprotective, insecticidal activity (Mushir *et al.*, 2016) [11]. Wound healing property of this plant is mainly due to presence of phytochemicals like glycosides, flavonoides and phenols (Sindhu *et al.*, 2015) [15]. *R. communis* is commonly called as castor plant belongs to Euphorbiaceae family it has antibacterial and antioxidant activity (Aziz *et al.*, 2016) [3], hepatoprotective effect, antifungal, anticancer effect (Suurbaar *et al.*, 2017) [17], antidiabetic, antiulcer activity (Kumar 2017) [9].

2. Materials
2.1 Location of Work
The research was conducted at the Department of Veterinary Parasitology, College of Veterinary Science, Tirupati, Sri Padmavathi Women's Degree College, DST Curie, Tirupati.

2.2 Materials
Glassware was procured from Borosil, and plastic ware was obtained from Tarsons and Eppendorf.

2.2.1 Equipment
The following equipment was used in the study: Mechanical grinder, beakers, Whatmann filter paper, cover-slips, UV visible– spectroscopy (SHIMADZU).

2.2.2 Chemicals and Reagents
Concentrated sulphuric acid, hexane, chloroform, diluted ammonia, ferric chloride, glacial acetic acid, acetone, ninhydrin, copper II acetate, mercuric chloride and potassium iodide, diluted sulphuric acid, diluted ammonia solution acid were used for the qualitative phytochemical analysis

3. Methodology
3.1 Collection of Plant Materials
Leaves of *A. indica*, flowers of *C. gigantea*, and leaves of *R. communis* were collected from

the premises of Sri Venkateswara Veterinary University, Tirupati. The plant materials were certified by the Department of Botany (GS02), Sri Venkateswara University, Tirupati.

3.2 Preparation of Plant Extracts
The collected plant materials were washed with tap water to remove extraneous matter present on the surface. Then the material was dried in shade to retain their phytochemical content and the plant materials were ground into a fine powder using a mechanical grinder.

3.3 Preparation of Aqueous Extract
For the extraction of phytochemicals, 10 grams of each powdered plant material (*A. indica*, *C. gigantea*, and *R. communis*) were added to 100 mL of distilled water in separate beakers. The beakers were covered and kept at room temperature for a day, to allow for the complete extraction of phytochemical compounds. After this the extracts were filtered using Whatman filter paper to obtain clear aqueous extracts. These extracts were then used for qualitative phytochemical analysis.

3.4 Qualitative Phytochemical Analysis
The aqueous extracts of *A. indica*, *C. gigantea*, and *R. communis* were subjected to qualitative phytochemical analysis to identify the presence of various phytochemical compounds. The following standard screening tests were performed:

3.4.1 Alkaloids
To test for alkaloids, a few drops of Wagner's reagent were added to a small amount of each plant extract separately. Formation of a reddish-brown precipitate indicated the presence of alkaloids.

3.4.2 Flavonoids
To test for flavonoids, a few drops of dilute ammonia solution were added to a small amount of each plant extract separately. The formation of a yellow color indicated the presence of flavonoids.

3.4.3 Glycosides
To test for glycosides, a few drops of diluted sulphuric acid were added to a small amount of each plant extract separately. The mixture was heated gently, and the formation of a reddish-brown color indicated the presence of glycosides.

3.4.4 Phenols
To test for phenols, a few drops of ferric chloride solution were added to a small amount of each plant extract separately. The formation of a bluish-black color indicated the presence of phenols.

3.4.5 Saponins
To test for saponins, a few milliliters of distilled water were added to a small amount of each plant extract separately in a test tube. The mixture was vigorously shaken for froth formation, which indicated the presence of saponins.

3.4.6 Terpenoids
To test for terpenoids, a few milliliters of chloroform were added to a small amount of each plant extract separately in a test tube. The mixture was shaken well and then filtered. The filtrate was evaporated, and the residue was treated with a few drops of concentrated sulphuric acid. The formation of a reddish-brown color indicated the presence of terpenoids.

3.4.7 Tannins
To test for tannins, a few drops of ferric chloride solution were added to a small amount of each plant extract separately. The formation of a bluish-black or greenish-black color indicated the presence of tannins.

3.5 UV-Visible spectroscopy (UV- Vis)
UV-Visible spectroscopy uses ultraviolet light to determine the absorbance of the sample. It measures the excitation or de-excitation of the particle when it absorbs light. 3 ml of the centrifuged sample is taken in a cuvette and scanned between 200-600 nm range for obtaining peak absorption. (UV-1800 series, SHIMADZU) (Sri Padhmavathi Womens Degree College, DST Curie, Tirupati)

4. Results
4.1 phytochemical analysis
The qualitative phytochemical analysis of aqueous extracts of *A. indica*, *C. gigantea*, and *R. communis* revealed the presence of various phytochemical compounds as summarized in Table (1) below and also shown in fig (1,2,3)

4.2 Ultra-Violet Visible spectroscopy (UV – Vis Spectroscopy)
4.2.1 *A. indica* plant extract
The maximum absorption peak of aqueous neem leaf extract was observed at 286 nm at an absorbance of 1.8 Au (Fig. 4).

4.2.2 *C. gigantea* plant extract
Maximum absorption peak of aqueous flower extract was observed at 275 nm at an absorbance of 0.9 Au (Fig. 5)

Table 1: The qualitative phytochemical analysis of aqueous extracts of *A. indica*, *C. gigantea*, and *R. communis* revealed the presence of various phytochemical compounds as summarized

S. No	Test	*A. indica*	*C. gigantea*	*R. communis*
1	Alkaloids	+	+	+
2	Anthraquinones	_	_	_
3	Carbohydrates	-	+	-
4	Flavonoids	+	+	+
5	Glycosides	+	-	+
6	Phenols	+	-	+
7	Proteins	-	+	-
8	Saponins	+	+	+
9	Terpenoids	+	+	+
10	Tannins	+	-	-

"+", "-" indicates positive and negative respectively for presence of respective phytochemicals,

4.2.3 *R. communis* plant extract
Maximum absorption peak of aqueous leaf extract was observed at 281 nm at an absorbance of 0.6 Au (Fig. 6).

5. Discussion
In present study phytochemical screening of aqueous *A. indica* leaf extract revealed presence of alkaloids, phenols, saponins, terpenoids, flavonoids, tannins, glycosides; *C. gigantea* flower extract revealed presence of alkaloids, saponins, terpenoids, proteins, flavonoids, carbohydrates and *R. communis* leaf extract revealed the presence of alkaloids,

phenols, saponins, carbohydrates, flavonoids, glycosides. The results were in totally agreement with Biu *et al.* (2009) [4] reported the presence of alkaloids, saponins, tannins, glycosides, terpenoids, flavonoids, carbohydrates in *A. indica* leaf extract,

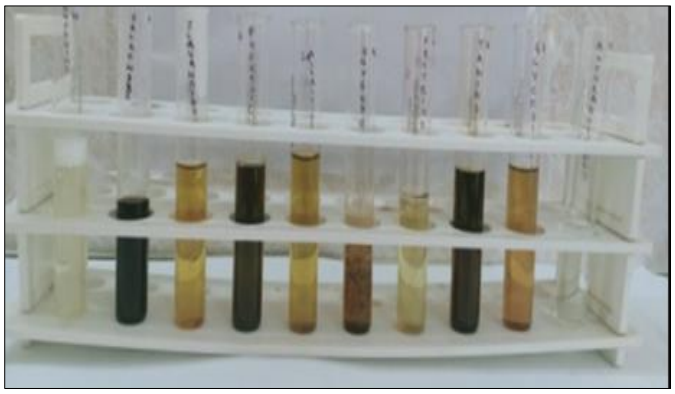

Fig 1: Phytochemical screening of *A. indica*

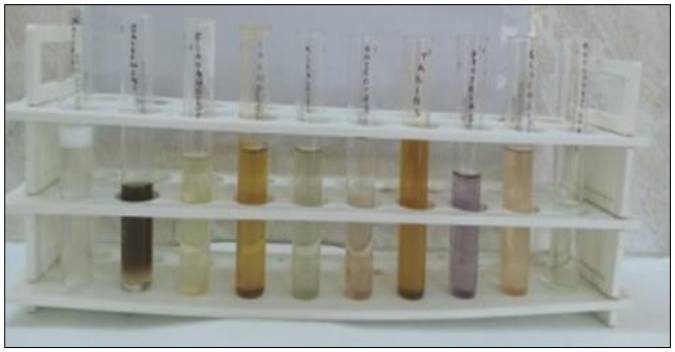

Fig 2: Phytochemical screening of *C. gigantea*

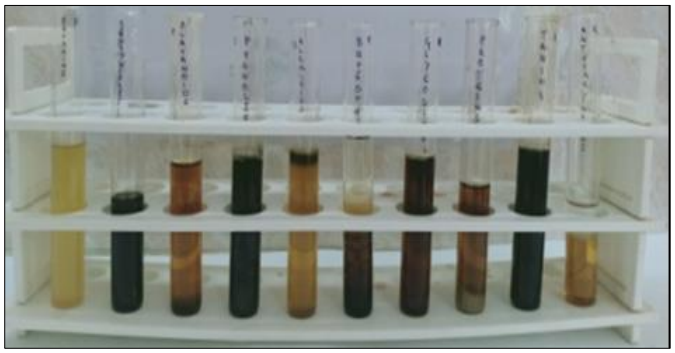

Fig 3: Phytochemical screening of *Ricinus communis*

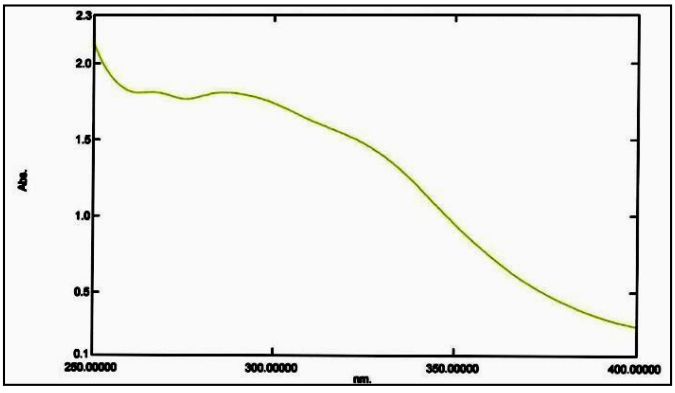

Fig 4: UV-Visible spectrum of localized surface Plasmon resonance of *A. indica* plant extract

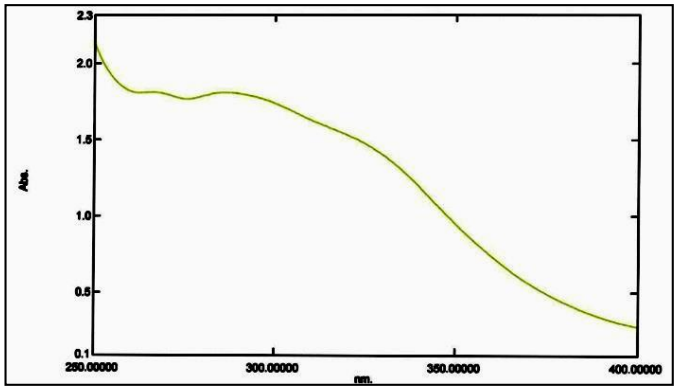

Fig 5: UV-Visible spectrum of localized surface Plasmon resonance of *C. gigantea* plant extract

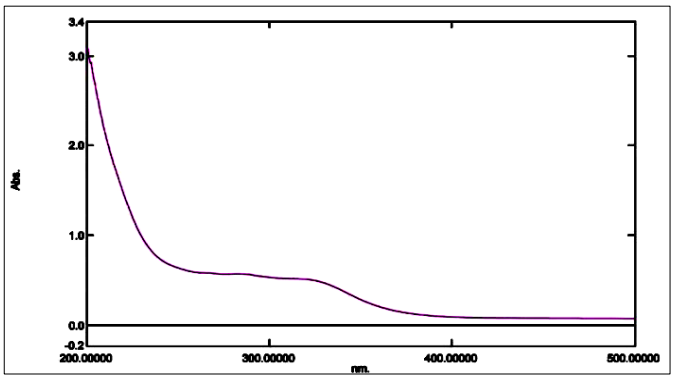

Fig 6: UV-Visible spectrum of localized surface Plasmon resonance of *R. communis* plant extract

Prashanth and Krishnaiah (2014) [12] reported the presence of alkaloids, carbohydrates, flavonoids, tannin and saponins in neem leaf extract; Sangeetha *et al.* (2020) [14] revealed that alkaloids, saponins, steroids, carbohydrates and proteins in *C. gigantea* flower extract, phytochemical screening of flowers of *C. gigantea* by Dhivya and Manimegalai (2013) [6] revealed presence of alkaloids, tannins, phenols, flavonoids, proteins and anthraquinones and Yadav and Agarwala (2011) [18] in *R. communis* leaf extract revealed the presence of carbohydrates, tannins, phenols, flavonoids, glycosides, steroids and saponins.

In the present study UV-Visible spectrum of aqueous *A. indica, C. gigantean* and *R. communis* plant extract showed maximum absorption at 286 nm, 275 nm, 281 nm, respectively. The results were in corroborate with reports of Abeer A. Abd El Aty *et al.* (2018) [1] reported that neem leaf extract showed characteristic peak at 320 nm, Dubhashi *et al.* (2013) [7] at 220 nm, Manwani *et al.* (2018) [10] at 225 nm, however Chakre *et al.* (2019) [5] reported maximum absorption peak of *C. gigantea* extract at 290 nm to 350 nm, Gajanan *et al.* (2016) [8] at 397 nm, Sravanthi *et al.* (2018) [16] at 300-350 nm range, whereas Zhu *et al.* (2018) revealed the strong absorption band of *R. communis* at 313 nm.

6. Conclusion

These phytochemical compounds are known to possess various biological activities and potential health benefits. Alkaloids have been reported to exhibit antimicrobial, antitumor, and analgesic properties. Flavonoids have antioxidant, anti-inflammatory, and anticancer activities. Saponins are known for their potential cholesterol-lowering and antifungal effects. Terpenoids have been studied for their

antimicrobial and antitumor activities. Tannins have antioxidant and antimicrobial properties.

In conclusion, the qualitative phytochemical analysis of the aqueous extracts of *A. indica*, *C. gigantea*, and *R. communis* revealed the presence of alkaloids, flavonoids, saponins, terpenoids, and tannins. These phytochemical compounds are known to have various biological activities and potential health benefits. The findings of this study provide a basis for further research on the therapeutic potential of these plants.

7. References

1. Abd El Aty AA, El-Bassyouni GT, Abdel-Zaher NA, Guirguis OW. Experimental study on antimicrobial activity of silk Fabric treated with natural dye extract from Neem (*Azadirachta indica*) leaves. Fibers and Polymers. 2018;19(9):1880-1886.
2. Alzohairy MA. Therapeutics Role of *Azadirachta indica* (Neem) and Their Active Constituents in Diseases Prevention and Treatment. Evidence-based Complementary and Alternative Medicine; c2016. p. 1-11.
3. Aziz S, Rabniwaz A, Habib-ur-Rehman, Ghani KhS. Phytochemical and Biological Screening of *Ricinus communis* Seed Oil Grown Wild in Jammu & Kashmir. Journal of Pharmacognosy and Phytochemistry. 2016;5(3):89-92.
4. Biu AA, Yusufu SD, Rabo JS. Phytochemical screening of *Azadirachta indica* (Neem) (Meliaceae) in Maiduguri, Nigeria. Bioscience research communications. 2009;21(6):281-283.
5. Chakre MB, Katare MM, Gaikwad PN, Medpalli KJ, Birru SB. Medicinal properties of *Calotropis gigantea*. International Journal of Research and Analytical Reviews. 2019;6(1):2349-5138.
6. Dhivya R, Manimegalai K. Preliminary phytochemical screening and GC-MS profiling of ethanolic flower extract of *Calotropis gigantea* Linn (Apocynaceae). Journal of Pharmacognosy and Phytochemistry. 2013;2(3):28-32.
7. Dubhashi S, Pranay V, Singaiah M, Satwik J. Studies on extraction and HPLC analysis of azadirachtin from kernels of neem seeds. Journal of Advanced Pharmacy Education & Research Journal. 2013;3(1):27-30.
8. Gajanan GV, Adhikrao Y. Study of Methanolic Extract of Leaves *Calotropis gigantea* (L.) As an Anti-Solar. Advances in complementary and Alternative medicine. 2016;1(4):2637-7802.
9. Kumar M. A review on phytochemical constituents and pharmacological activities of *Ricinus communis* L. plant. International Journal of Pharmacognosy and Phytochemical Research. 2017;9(4):466-472.
10. Manwani D, Kumar MNR, Arjunram JS, Vishwanath TY, Akash K, Bhargav ASSS, *et al*. Study of UV Absorption Spectra of Plant Extracts and Identification of Compounds Present In It. International Journal of Management, Technology and Engineering; c2018. p. 2249-7455.
11. Mushir A, Jahan N, Ahmed A. A review on phytochemical and biological properties of *Calotropis gigantea* (Linn.) R. Br. Discovery Phytomedicine. 2016;3(3):15.
12. Prashanth GK, Krishnaiah GM. Chemical composition of the leaves of *Azadirachta indica* Linn (Neem). International Journal of Advancement in Engineering and Technology, Management and Applied Science. 2014;1(3):21-31.
13. Sandhir R, Khurana M, Nitin KS. Potential benefits of phytochemicals from *Azadirachta indica* against neurological disorders. Neurochemistry International; c2021. p. 146.
14. Sangeetha K, Steffi PF, Selvi BT, Priyadarshni S. Phytochemical Evaluation, GC-MS Analysis of Phytoactive Compounds and Antibacterial Activity Studies from *Calotropis gigantea*. Journal of Pharmaceutical Sciences and Research. 2020;12(6):789-794.
15. Sindhu R, Alarfaj AA, Gurusamy A. Estimation of phytochemical analysis and *in vitro* antioxidant activity of *Calotropis gigantea* extract: wound healing activity and its biomedical application. International Journal of Pharmaceutical Sciences and Research (IJPSR). 2015;6(7):3053-3060.
16. Sravanthi K, Ayodhya D, Swamy PY. Green synthesis, characterization of biomaterial-supported zero-valent iron nanoparticles for contaminated water treatment. Journal of Analytical Science and Technology. 2018;9(1):1-11.
17. Suurbaar J, Mosobil R, Donkor AM. Antibacterial and antifungal activities and phytochemical profile of leaf extract from different extractants of *Ricinus communis* against selected pathogens. BMC research notes. 2017;10(1):1-6.
18. Yadav RNS, Agarwala M. Phytochemical analysis of some medicinal plants. Journal of phytology, 2011, 3(12).
19. Zhu QL, Gu H, Ke Z. *Congeneration biodiesel*, ricinine and nontoxic meal from castor seed. Renewable Energy. 2018;120:51-59.