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ESTIMATION OF PHYTOCHEMICAL CONSTITUENTS OF *MERREMIA DISSECTA* (JACQ.) HALLIER F.

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ABSTRACT:

The present investigation was carried to determine the presence of different phytochemical compounds of *Merremia dissecta* seed. *Merremia dissecta* (J) Hallier. Is commonly called as "Alamo vine" belonging to family Convolvulaceae. Phytochemical analysis of seed was carried out by using series of solvents such as petroleum ether, chloroform, ethanol and acetone by Soxlet method. Qualitative Phytochemical analysis showed the presence of carbohydrates, glycosides, alkaloid, phenolic compound, flavonoids and proteins etc. Physicochemical parameters such as Moisture content, Loss on drying, total ash, acid insoluble ash and water soluble ash were determined. Moisture content, Loss on drying, total ash, acid insoluble ash and water soluble ash were 9.8% w/w, 8.2 % w/w, 4.01% w/w, 0.78% w/w and 2.4% w/w respectively. Aim of the study was to evaluate the parameter to determine the quality of the seed of *Merremia dissecta*. Qualitative Phytochemical and physicochemical evaluation is essential for standardization of crude drugs.

Keywords: *Merremia dissecta,* Soxlet, Phytochemical, physicochemical.

INTRODUCTION:

The family Convolvulaceae is recognized as morning glory family. Family Convolvulaceae comprises about 58 genera and 1650 species of herbs, climbers or shrubs distributed in tropical and subtropical regions. The genus *Merremia*, commonly referred to as wood roses (Sowndhararajan and Chin, 2014).*Merremia* Dennst. Ex Endl. Is a large genus of Convolvulaceae family having over 100 species of flowering plants. About 20 genera and over 150 species have been reported from India?

Plant parts remain the leading source of pharmaceutical drugs and activators used in common medicines (Bilal*et al.*, 2022).Local people used leaf paste to cure herpes zoster so it commonly called "Nagin vel". *Merremia dissecta* oil showed antimicrobial (Joshi *et al.*, 2015 and Theng *et al.*, 2015), anti-oxidant and antidiabetic

activity. The present investigation was to evaluate the parameters to determine the quality of the seed of *Merremia dissecta*. Qualitative Phytochemical and physicochemical analysis is essential for standardization of crude drugs.

MATERIALS AND METHOD:

Collection of plant materials:

Seeds of *Merremia dissecta* were collected from Chikhli Taluka of Dist. Buldhana (M.S.). The plant species identification was confirmed by using standard literature (Pullaiah *et al.*, 2011). The shade dried seed material was grind into fine powder by using grinder mixture. The seed powder was stored in the air tight container and used for extraction.

A B

Fig.1: Merremia dissecta (Jacq.) Hallier F.: A- Fruiting, B- Seed

Extraction of Plant Drugs:

The powdered seed material was subjected to extraction in a Soxlet apparatus. The powdered seed material was consecutively extracted with petroleum ether, chloroform, acetone and ethanol as a solvent.

Phytochemical Evaluation (Evans, 2005; Kokate, 1986; Khandelwal, 2006):

In preliminary Phytochemical evaluation of *Merremia dissect* seed powder extract was subjected to various qualitative chemical tests to estimate the presence of various phytoconstituents. The qualitative test for carbohydrates, alkaloids, glycosides, tannins, phytosterols, flavonoids, saponins and proteins were taken.

Physico-chemical Evaluation:

Physicochemical analysis of seed powder was carried out by using different test parameters such as total cash value, water soluble ash, acid insoluble ash, and extractive value and moisture contents per standard methods (Gupta.1984).

RESULTS AND DISCUSSION:

The Phytochemical evaluation of seed extracts revealed the presence of alkaloid, glycoside, phytosterols, saponins, flavonoids, tannin and carbohydrates. The result was showed in table no. 1. Phytochemical investigation of *Merremia dissecta* revealed that presence of various phytoconstituents like alkaloids, glycosides, tannins, saponins, amino acid, flavonoids and phenols (Bilal*et al.*, 2022 and Joshi *et al.*, 2015).

Table 1: Phytochemical study of *Merremia dissect* seed powder

Test for Phytochemical	Test/ Reagents	Solvents			
		Pet. Ether	Chloroform	Acetone	Ethanol
Alkaloid	Dragandorff's	+	+	-	+
	Mayer's	-	+	-	-
	Hager's	-	-	-	-
	Wagner's	-	+	-	-
Glycosides	Bornstrager's	+	+	+	+
Phytosterols	Liebermann-Burchards	+	+	-	-
Proteins	Biuret's	+	+	+	+
	Millon's	+	+	+	+
Amino Acid	Ninhydrin	+	+	-	+
Saponin	Foam Test	+	+	+	+
Tannin	Ferric Chloride	+	+	+	+
Flavonoids	Lead acetate	+	+	+	+
Carbohydrates	Fehling's	+	+	+	+

The most important bioactive chemical constituents present in a seed powder extracts like alkaloids, tannin, saponins and flavonoids. These bioactive compounds are actually the defensive mechanism of the plants against various pathogens. These bioactive compounds were active chemicals against different pathogens, so crude drug having complex ethno medicinal value.

Physicochemical Evaluation:

Physicochemical evaluations, parameters such as moisture content, loss on drying, total ash, acid insoluble ash and water-soluble ash were determined. Moisture content, loss on drying, total ash, acid insoluble ash and water soluble ash were 9.8%

w/w, 8.2 % w/w, 4.01% w/w, 0.78% w/w and 2.4% w/w respectively. The result mentioned in table 2.

Table 2: Physicochemical parameters of *Merremia dissecta* seed.

Sr. no.	Parameters	Results (%)
1	Moisture content	9.8
2	Loss on drying	8.2
3	Total ash	4.01
4	Acid insoluble ash	0.78
5	Water soluble ash	2.4

Intention of this investigation was to evaluate the physicochemical parameter to determine the quality of the seed of *Merremia dissecta*. It is essential for standardization of crude drugs.

CONCLUSION:

The bioprospecting of medicinal plants through standardization with analysis of bioactive metabolites and physicochemical parameters. The present investigation provides the evidence that plants contain bioactive metabolites that excuse their medicinal value. *Merremia dissecta* is a good source of phytoconstituents to treat number of diseases that can be utilized to cure disease.

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A STUDY ON MULTIFUCTIONAL APPLICABILITY OF CARBON NANOTUBE, GRAPHENE AND THEIR COMPOSITE

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ABSTRACT:
Carbon based materials such as carbon nanotube and Graphene is one of the most promising materials in the field of nanotechnology and which has attracted a tremendous amount of research in the last few years. Because of its high surface to volume ratio, high electrical conductivity, high mechanical strength, high thermal conductivity,high electronic mobility, and high chemical stability. dew to such property CNTs and GNS is extremely attractive materials. In this review paper we are studied about multifunctional applicability about carbon nanotube and graphene and their composite with various semiconducting metal oxides such as ZnO,TiO2,SnO2,CuO,ZnS,etc and conducting polymers such as polyaniline (PANI).etc and studied there applicability in various filed such as gas sensors, bio sensors, supercapacitors, photocatalysis activity and many biological applications.

Keywords :- Carbon nanotube, Graphene, nanotechnology, semiconducting metal oxides, conducting polymers.

INTRODUCTION :

Carbon is an IV group of element. Carbon is known to be associated with its rich and diverse form of chemistry. Carbon atoms participate in the formation of a great number of molecules. carbon nanomaterial's have a unique place in Nano science due to their exceptional electrical ,thermal, chemical, and mechanical properties; which have applications in various areas such as composite materials ,energy storage conversion ,sensors, drug delivery, field of emission devices, and Nano scale electronic devices. development of nanofabrication techniques and nanomaterials that have progressed within the last two decades, graphite is now being actively used as a starting material to engineer various types of carbon-based nanomaterials (CBNs), including single or multi-walled nanotubes, fullerenes, nanodiamonds, and Graphene. In the last few years, study of carbon based nanomaterials have become the most studied for developing of gas sensors, biosensors, supercapacitors , photocatalytic activity , photoluminescence and lithium ion battery etc. carbon nanomaterials are used Specially because of their outstanding and remarkable physical and electrical properties. carbon nanomaterials e.g., carbon black (CB), fullerene, carbon fiber (CF) , carbon nanotubes (CNTs) and graphene(GNS)(fig 1) Graphene and CNTs are allotropes of carbon. Graphite is a multilayers form of carbon. Graphene is a single layer of graphite and it is 2 dimensional and when graphene is in cylindrical form then it is called as carbon nanotube ,this are obtained in single layer and multilayer form and it is 1 dimensional nature which have received a great covenant of attention as materials, With

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their inherent physical and electrical properties, such as high surface-to-volume ratios, high electrical or heat conductivities, chemical inactivity, and high tensile strength. With the deeper gratefulness development of nanofabrication techniques and nanomaterial's that have developed within the last two decades, graphite is now being actively used as a starting material to engineer various types of carbon-based nanomaterial's (CBNs), including single or multi- walled nanotubes, fullerenes, Nano diamonds, and Graphene [1] These carbon based materials possess excellent mechanical strength, electrical ,thermal conductivity, and optical properties much of the research efforts have been focused on developing these advantageous properties for various applications, such as high-strength composite materials and electronics. Each member of the carbon family exhibits unique features and has been broadly exploited in various biological applications including bio sensing, drug delivery, tissue engineering, imaging, diagnosis and cancer therapy [2]

Carbon-based nanomaterials, such as carbon nanotubes (CNTs),and graphene(GNS) can be found in functionalized or non-functionalized forms. graphene or carbon nanotubes can be functionalized with –COOH and –OH groups via chemical oxidation methods to produce GO and functionalized carbon nanotubes, which are highly dispersible in water compared to their pristine counterparts. These nanomaterials can also be functionalized with metal or metal oxides. such as ZnS, SnO_2 , TiO_2,WO_2, .[3]. With increasing interest in nanotechnology, many types of metallic and carbon-based nanomaterials have emerged. Initial interest in these nanomaterials was for application in the electronics industry, due to their exceptional thermal and electrical properties.[3] Nanocomposites are the combinations of two or more nanoparticles synthesized by various techniques which shows unique physical properties and extensive application potential in different areas.

Applications of carbon based materials

Carbon based materials Such as SWCNT, MWCNT and GNS	**Biological Applications**	**Electronic**	**Sensing Applications**
	Drug delivery, tissue engenearing, imaging diagnosis, cansor theapy, antibacterial study, dye detection	Solar cell, semiconductor chip, supercapacitor. Batteries, photocatalitic activity	Gas sensors detection of flammable and toxic gasses Bio sensors used as dye removal

Types of carbon-based nanomaterials

There are various types of carbon nanomaterials such as carbon black, fullerence , carbon nanotube and graphene all this nanomaterials their properties and applications discus as follows

Carbon black

Carbon black is produced by the incomplete combustion of coal and coal tar, petroleum products or vegetable matter. Carbon black is a form of Para crystalline carbon that has a high surface-area-to-volume ratio, although lower than that of activated carbon Carbon black is used as a colorant and reinforcing filler in tires and other rubber products; pigment and wear protection additive in plastics, paints, and ink pigment. It is used in the as a food colorant when produced from vegetable matter Carbon black is available with surface areas that are higher than 1000 m2/g, particle size lower than 50 nm, and density much lower than the theoretical value for graphite (2.25 g/cm3).[4]

Fullerenes

Fullerene is nothing but an allotrope of carbon it consist of carbon atoms that are connected by single and double bond .the structure is quite

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similar to that of graphite and is made up of sheet connected hexagonal cage like structure ,they are referred as buckyballs and buckytubes like structure. Fullerenes are stable, but not totally unreactive. Fullerenes are used in the medical field as light activated antimicrobial agent.it is used as conductor, it is used in making cosmetics product

Carbon Nanotube

Carbon nanotubes can be considered as cylindrical formed by rolling or folding of Graphene sheet. There are two types of carbon nanotubes 1) single walled carbon nanotube (SWCNT) and 2) multi walled carbon nanotubes (MWCNT). CNTs were discovered in 1991 by Iijima et al., there has been a rising interest among researchers to discover their unique mechanical stiffness, strength, high thermal conductivity, electrical, chemical, mechanical and physical properties to develop high performance devices in nanotubes for their numerous applications. CNT can be observed as one of the most promising materials among their Nano scale material. Carbon nanotubes are a very sensitive material because they can easily interact with many gases and change their conductivity in the presence of several studies at room temperature, even if these investigates have different chemical behaviour Because of the arrangement of the atoms on the surface of the MWCNTs and their high area/volume ratio, adsorption processes are highly preferred, which increases their sensitivity to the surrounding atmosphere[5]. MWCNTs can vary greatly, which includes variations in outside diameter, number of concentric walls along with growth-induced structure, such as internal caps of nanotube walls, and other defects in the graphitic structure. Furthermore, depending on the growth conditions, nanotubes can be quite straight or highly entangled in their bulk forms. This wide range of variability in nanotube structure and the structure/size dependence of nanotube properties is a key barrier towards applications of carbon nanotubes in structural and functional composites.[6]

The carbon nanotube has been attractive in various applications such as energy storage devices, sensors and actuators. The one-dimensional Nano scale structures of nanotubes, nanowires, and nanoparticles have a large surface area to volume ratio, which is an advantage to maximize the surface response.[7] The fibre like structure of the CNT can have tremendously large aspect ratios (length/diameter) which is particularly necessary for both mechanical strengthening and the creation of electrically conductive ways for electrical property variation[6] CNTs have attracted growing attention as a highly competent vehicle for transporting various drug molecules into the living cells because their natural morphology helps penetration across the biological membranes. Carbon nanotubes are widely used in biomedical applications due to their versatile properties. These are the attractive candidates for the carrying of anticancer drugs, genes and proteins for chemotherapy [2]

Carbon nanotubes (CNTs) attract more attention because of their unique properties and have become the most promising materials for high-sensitive gas sensors. As a kind of promising sensing material, CNTs, have been found to possess electrical properties and are highly sensitive to extremely small quantities of gases, such as alcohol, ammonia (NH3), carbon dioxide (CO2) and nitrogen oxide (NOx) at room temperature,[8] Among the different carbon allotropes, CNTs have attracted escalating attention as a highly competent vehicle

CNT Based Nano composite materials

Nano composites are the mixtures of two or more such Nano sized substances or nanoparticles synthesized by some appropriate techniques shows unique physical properties

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.The wide scientific and technical interest in developing of composite materials, wherever can take advantage of the unique properties of carbon nanotubes, has resulted in a tremendous amount of literature on the processing, characterization, and demonstrating of CNT-based composites.

Carbon nanotube /polymer composite are synthesized as a promising materials for industrial devices with advanced applications such as supercapacitors, sensors, electromagnetic absorbers, photovoitaic cells, photodiodes and optical limiting devices (murat ates et al,2017) The elastic behavior and strength of SWCNTs and MWCNTs have been studied extensively. One of the major reasons for the interest in utilizing carbon nanotubes as reinforcements in polymer nanocomposites is their reported exceptionally high stiffness and strength as compared to existing high-performance carbon fibers [6] multiwall carbon nanotube (MWNT) doped polyaniline (PANI) composite thin films for hydrogen gas sensing applications.[9] A pristine CNT exhibits low sensitivity or response signals for many pollutant gases such as NO2, CO or NH3 Therefore, dopants or many metal nanoparticles have been introduced to CNTs to enhance their sensing performance such as response signal, recovery time and operation temperature [10]

Graphene

Graphene is a 2D single layer of carbon atom with hexagonal packed structure. Nanomaterial consist of single atom thick layer. Structural arrangement is of sp2-hybridized carbon atoms. This structure offers unique optical, mechanical, and electrical properties, including high strength, thermal conductivity, flexibility, and biocompatibility. Among these properties, Over the last two decades, research on Graphene has greatly increased, and various exceptional properties have been observed by investigators. Graphene is described as the planar graphitic sheet of graphite, consisting of sp2 hybridized carbon network with a carbon-carbon distance of 1.42Å and an interlayer spacing of 3.4Å (Figure no 2) The two dimensional graphene is a promising conductor because of optical and electrical properties. Among the various allotropes of carbon, graphene is the most attractive material due to its unique intrinsic properties. Around 70 years ago, in 1947, Wallace evaluated the electronic structure of graphene and McClure deduced the corresponding wave equation in 1956. The name “graphene” was first introduced in 1987 by Mouras and co-workers as “graphitic intercalation compounds[2] In principle, electrons in individual graphene sheets delocalize over the complete sheet, which provides ballistic charge transport [11]

Nanocomposite materials

As compared to the study of single GNS based material, composite of Graphene with many materials such as in metal oxide ZnO, SnO2,TiO2,WO2,MnO2, Fe2O3,NiO,CuO,ZnS ,CdS and so on and conducting polymers such as Polyaniline , polypayrrole which shows better electrical ,mechanical, chemical and magnetic properties , and they shows better applicability as compare to study of individual material Graphene and graphene-based nanocomposites have also been used in bacteria detection and antibacterial applications. It has been reported that GO presents antibacterial effect, although the mechanisms and efficacies are under certain debate.[12] The attachment of commercial TiO2 powders to graphene has also been extensively researched for improved photocatalytic performance. The development of graphene/TiO2in photo catalysis should first be attributed to the improved absorptivity of pollutant molecules, which is a requirement for good photo catalytic activity. It is well known that carbonaceous materials have outstanding absorption properties this is used in various

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environmental applications. [13] G-based composites have emerged and exhibited applicable properties. One of the most commonly used ones is PANI/G or PANI/GO super capacitors. PANI/GO is utilized in super-capacitors with high performance, durability, and environmentally friendly features [14] GO/PANI composites have shown higher specific capacitances than PANI, as well as a higher stability after 1000cycles (i.e., capacitance retention was around 86%)[15] Likewise, PANI/G displayed higher conductivity and electromagnetic interference (EMI) shielding than PANI at room temperature The GO/PANI composite displays an excellent electrochemical performance due to a synergistic effect between PANI and GO. Besides,[15]

Multifunctional Applicability of carbon based Nano composite

Carbon based composite materials	**Method for preparation of composite**	**Morphology and particle size**	**Field of applications**	**Referen-ces**
GNS/TiO2	Hydrothermal method	100 nm and 20nm	Electrochemical biosensor assess the freshness of meat	[16]
PANI/ GNS and Ppy/GNS	Chemical oxidation polymerisation	5% GNS highly porous clearly seen	Electromagnetic interference shielding	[5]
PANI/MWCNT (Nanofiber)	Electrospinning	272nm(at 0.1g/ml)	L.P.G.gas sensing	[5]
PANI/TIO2 PANI/GNS	Situ chemical oxidation polymerisation	2micro-meterfor PANI/Tio2 1 micro-meter for Core shell type structure indicating more surface area	Dye Removal	[5]
GO/IONP	Two step process	100 nm	Antibacterial study	[12]
GNS/PANI	Modified hummers and composite by situ polymerization	3 to 5 micro -meter	Super capacitors	[17]
PANI/MWCNT	Situ oxidative polymerisation	30-40 nm , obtained interwoven fibrous structure	Transport properties	[9]
AuNPs/MWCNT PdNp/MWCNT		100nm 100NM	For No2 gas sensing(at 45 to 250 ^{0} C)	[10]
CuO/SWCNT	Hydrothermal method	1.5 to 6(micro-meter)	Highly sensitive wireless H2S gas sensor	[18]
TiO2/GNS	In situ growth and reduction process or a facile, one-pot growth method.	100 to 400 nm	Photo catalytic performance	[13]
PANI/GO	Chemical oxidation polymerisation method	layered and fibrous structures .(100nm)	High performance super capacitors	[15]

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CONCLUSIONS :

Carbon based materials such as carbon nanotubes and Graphene both are extremely very promising materials in the field of material science; due to their unique properties and multifuctionality. As compared to the study of single carbon based materials. Composite with many metal oxide such as ZnO,TiO2, SnO2 etc and conducting polymers such as polyaniline (PANI) which shows potential application in various field of super capacitor, gas sensors ,photo catalytic activity ,and bio sensing applicability

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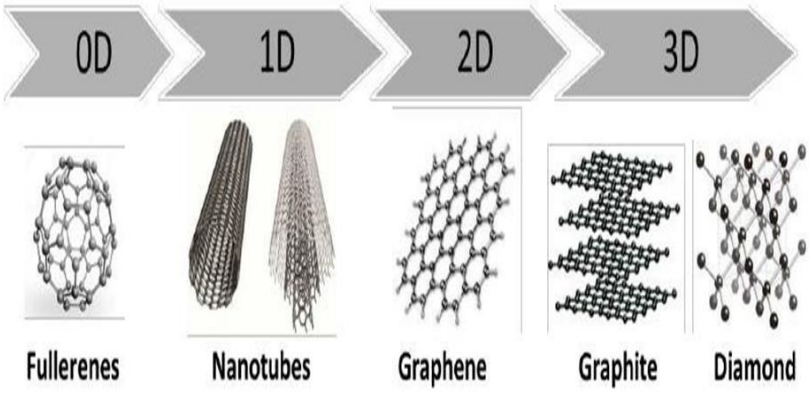

Figure 1:types of carbon based materials. © Source by, @phdthesis{phdthesis, author = {Srivatsa, Thushar}, year = {2017}, month = {08},title = {Graphene Based surface coatings on ceramic membranes for water desalination}

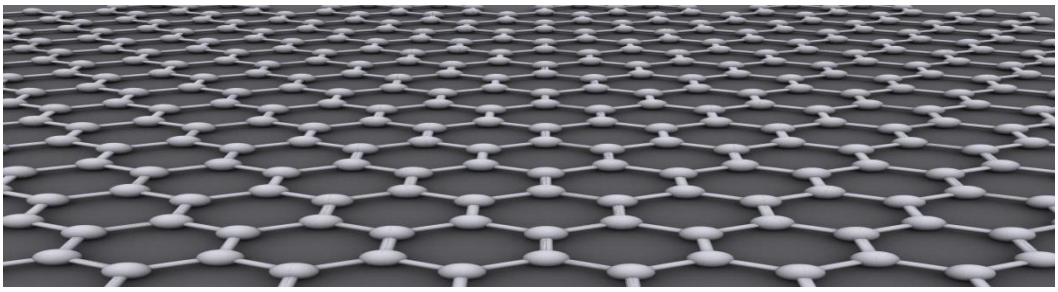

Figure no-2 structure of Graphene (source by https://en.wikipedia.org/wiki/Graphene)

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