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CASTOR BEANS: RICINUS COMMUNIS

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ABSTRACT:-
Medicinal plants have a vital role to preserve the human healthy life. The large family Euphorbiaceae contains nearly about 300 genera and 7,500 species. Generally they are the flowering plants. Amongst all, the Ricinus communis or castor plant has high traditional and medicinal value for maintain the disease free healthy life. Traditionally the plant is used as laxative, purgative, fertilizer and fungicide etc. whereas the plant possess beneficial effects such as antioxidant, antihistaminic, Antinociceptive, antiasthmatic, antiulcer, immunomodulatory, Antidiabetic,hepatoprotective, Antifertility, anti inflammatory, antimicrobial, central nervous system stimulant, lipolytic, wound healing, insecticidal and Larvicidal and many other medicinal properties. This activity of the plant possess due to the important phytochemical constituents like flavonoids, saponins, glycosides, alkaloids and steroids etc. The aim of this paper is to explain the details of phyto-pharmacological properties of Ricinus communis for the future
research work.

INTRODUCTION:-
It is truth that without nature human being life is not possible. The food, clothes and shelter are three basic necessity of human beings and an important one necessity is good health, which provided by plant kingdom. Plant kingdoms are the rich source of organic
compounds, many of which have been used for medicinal purposes. In traditional medicine, there are many natural crude drugs that have the potential to treat many disease and disorders one of them is Ricinus communis; Family: Euphorbiaceae popularly known as 'castor plant' and commonly known as palm of Christ, Jada (Oriya), Verenda (Bengali), Endi (Hindi), Errandi (Marathi), Diveli (Guajarati)[1]. The plant is widespread throughout tropical regions as ornamental plants.

KEYWORDs:-
Introduction,Botany,Habitat,DistinguishingFeature.Cultivation Climate.Taxonomy..

BOTANY:-
Castor plant, Ricinus communis L. is a species of flowering plant in the spurge family; Euphorbiaceae,which contains a vast number of plants mostly native to the tropics . It belongs to a monotypic genus Ricinus.The name Ricinus is a latin word for tick. The plant is named probably because it seed has markings and a dump at the end that resemble certain tick .The common Name castor oil comes from its uses as a replacement for a perfume base made from dried perinea glands of beaver [2].

HABITAT:-

This plant is common and quite wild in the jungles in India and it is cultivated throughout India, chiefly in the Madras, Bengal and Bombay presidencies.

Two varieties of this plant are known

• A perennial bushy plant with large fruits and large red seeds which yields about 40 % of oil;

• A much smaller annual shrub with small grey (white) seeds having brown spots and yielding 37% of oil1.

DISTINGUISHING FEATURES:-

A large robust shrub often growing 3 m or more in height.its thick, hollow, hairless stems bear large leaves up to 70 cm across.these leaves usually have 7-9 finger-like lobes and the leaf stalk is attached to their undersides.separate male and female flowers are borne in elongated clusters (8-15 cm long), with the reddish female flowers on top and the yellowish male flowers below.its capsules (10-30 mm across) are greenish to bright red

Fig:-(a)Plant (b) Fruits

CULTIVATION CLIMATE:-

It can be grown even at high altitude up to 2000 meters and intact perennial types are said to do best altitude above 850 meters. The plant can withstand dry arid climates, as alsoheavy rains and floods; it is however, susceptible to damage by frost. Soil: Eranda is generally grown on sandy or clay of deep red loams and on good light alluvial loams. Like Horse gram (Dolichos biflorus) castor is one of the crops which can be grown economically even on gravelly and poor soils. Deep black cotton soil are not usually employed for castor nor are very fertile soils with high nitrogen content as they produce excessive vegetative growth, it is also grown under irrigation and as a abide or border crop to ginger, turmeric, sugarcane etc. Season: In general, it is shown in June-July or some-times latter in September-October. In Gujarata the perennial types are grown during "Kharif"and the annual types during "Rabi"season[3].

TAXONOMICAL CLASSIFICATION[4]:

Kingdome	Plantae
Sub-kingdom	Tracheobionta
Order	Malpighiales
Family	Euphorbiaceae
Sub -family	Acalyphoideae
Genus	Ricinus
Species	Communis

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BENEFITS OF THE PLANT

The castor oil obtained from the seed of the plant is still widely used traditionally and herbally as a medicine. The seed of the plant isused as fertilizer after the oil was extracted from the seed and cooked to destroy the toxin and incorporated into animal feeds. The principal use of castor oil is as a purgative and laxative. It is also used as a lubricant, lamp fuel, a component of cosmetics, and in the manufacture of soaps, printers ink, plastics, fibers, hydraulic fluid, brake fluid, varnishes, paints, embalming fluid, textile dyes, leather finishes, adhesives, waxes, and fungicides. In India, the leaves are used as food for eri silk worms and the stalks are used for fuel purpose. This species has been planted for its dune stabilization properties [5],[6],[7]

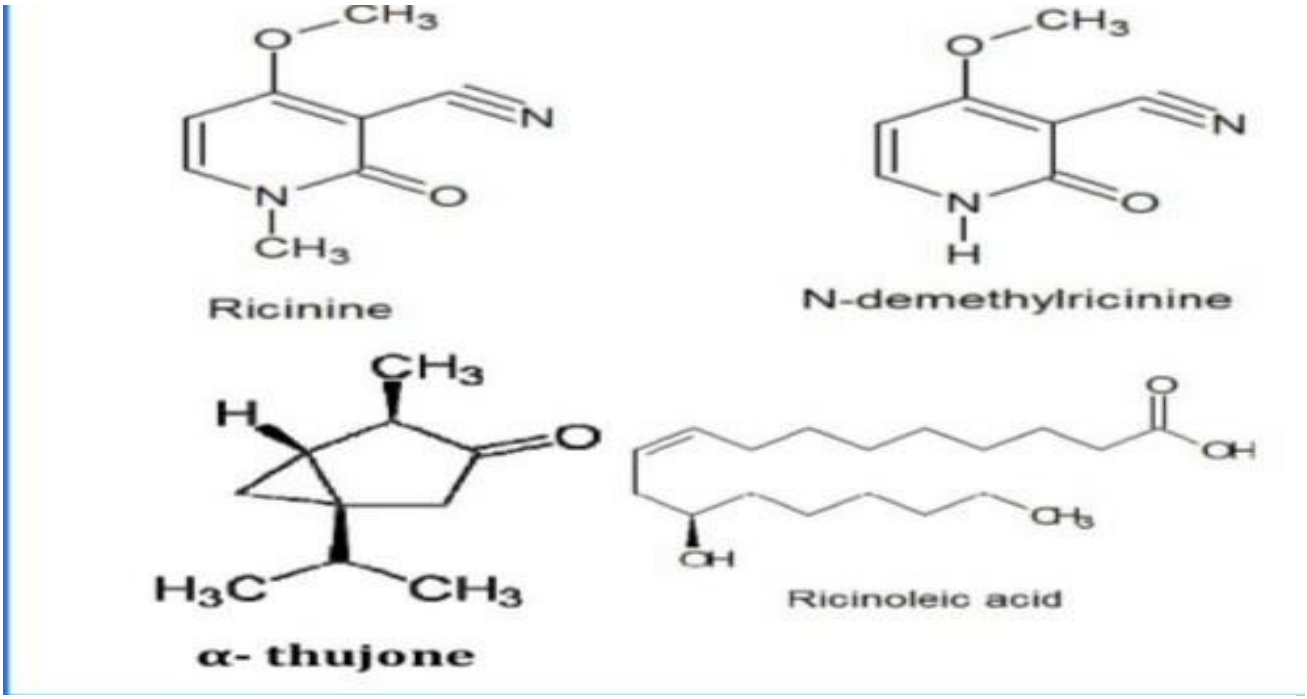
ANCIENT USE OF RICINUS COMMUNIS:-

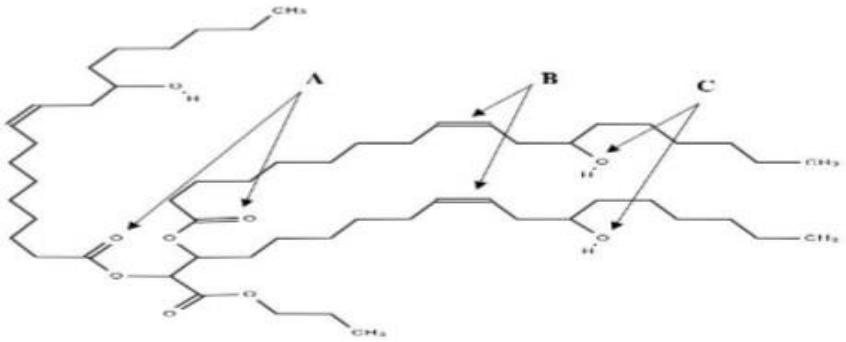
The castor beans are known for their high toxicity for centuries. In ancient times, farmers knew to keep their livestock away from the castor plant or else they would risk losing them. Their seeds have been used in folk medicine against a wide variety of diseases[8]. The use of the castor bean seed proteins has been reviewed for medical treatments since ancient times. Later, their important roles in the early days of immunological research and some of the fundamental principles of immunology were discovered. During the last three decades, the mechanism of action of the toxins was elucidated. This led to a major effort to target the toxins to malignant cells. Ricin has been used in bioterrorism also. Recently, the toxins have played important roles as experimental models to elucidate the intracellular trafficking of endocytosed proteins[9]. Castor oil is still produced in large

quantities throughout the world and the toxin which remains in the castor meal after the oil has been extracted with hexane or carbon tetrachloride is easily removed through a simple salting-out procedure.There are versatile uses of this plant (oil, leaf, seed and fruit) in different aspects of life. The treated oil can also be used as paints, enamels and varnishes, oiled fabrics, linoleum, patent leather, flypaper, typewriting, printing inks, greases and special lubricants [8]The leaves have also been recommended in the form of a decoction or poultice and as an application for women to increase the secretion of milk. The castor cake is used as manure in this sub-continent especially in India. It is rich in nitrogen and other minerals, and has been found to be suitable as manure for paddy, sugarcane, tobacco, etc. The powdered leaves are used for repelling aphids, mosquitoes, white flies and rust mites. The leaves are said to be used in the form of a poultice or fomentation on sores, boils and swellings. Castor oil is commonly applied over the abdomen to give relief in the flatulence in the children [10]

CHEMICAL CONSTITUENTS:-

The preliminary phytochemical study of R. communis revealed the presence of steroids, saponins, alkaloids, flavonoids, and glycosides in it. The dried leaves showed the presence of two alkaloids, ricinine (0.55%) and Ndemethylricinine (0.016%) and six flavones: glycosides,kaempferol-3-O-β-D-Xylopyranoside,kaempferol-3-O-βD-glucopyranoside,quercetin-3-O-β-D-xylopyranoside,quercetin-3-O-β-D-glucopyranoside,kaempferol-3-O-βrutinoside and quercetin-3-O-β-rutinoside[11]. The monoterpenoids (1, 8-cineole, camphor and α-pinene) and sesquiterpenoid (β-caryophyllene), gallic acid, quercetin, gentisic acid, rutin, epicatechin and ellagic acid are the major phenolic compounds isolated from the leaves. Indole-3-acetic acid has been extracted from the roots21, 22The seeds and fruits contain 45% of fixed oil, which consist glycosides of ricinoleic, isoricinoleic, stearic,dihydroxystearic acids, and also lipases and a crystalline alkaloid, ricinine. The GLC (Gas Liquid Chromatography) study of castor oil showed the presence of ester form of palmitic (1.2%), stearic (0.7%), arachidic (0.3%) hexadecenoic (0.2%), oleic (3.2%), linoleic (3.4%), linolenic (0.2%), ricinoleic (89.4%) and dihydroxy stearic acids. The stem also contains ricinine. The ergost- 5-en-3-ol, stigmasterol, Y-sitosterol fucosterol; and one probucol isolated from the ether extract of seeds. The GC-MS analyses of R. communis essential oil (using capillary columns) are identified compounds like α-thujone
(31.71%) and 1, 8- cineole (30.98%), α-pinene (16.88%), camphor (12.92%) and camphene (7.48%). Lupeol and 30-Norlupan-3β-ol-20-one are obtained from coat of castor beam[8]





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PHYTOPHARMACOLOGY OF RICINUS COMMUNIS:-

ANTIOXIDANT ACTIVITY:-

R. communis seed extracts produce the antioxidant activity by using lipid per oxidation via ferric thiocyanate method and free radical scavenging effect on 2,2 diphenyl-1-picrylhydrazyl radical (DPPH) and hydroxyl radical generated from hydrogen peroxide. The high antioxidant activity of the R. communis seed at low concentration

shows that it could be very useful for the treatment of disease resulting from oxidative stress. The responsible chemical constituent of R. communis, which produces antioxidant activity, is methyl ricinoleate, ricinoleic acid, 12-octadecadienoic acid and methyl ester. R. communis stem and leaf extracts also produce antioxidant activity due to the presence of flavonoids in their extracts28. Some studies revealed that gallic acid, quercetin, gastric acid, rutin, epicatechin and ellagic acid are the major phenolic compounds responsible for the antioxidant activity of the R. communis dry leaves[12]

ANTI ASTHAMATIC ACTIVITY:-

The ethanolic root extract of R. communis is effective in treatment of asthma because of its antiallergic and mast cell stabilizing potential effect. Saponins has mast cell stabilizing effect and the flavonoids possess smooth muscle relaxant and bronchodilator activity; the

apigenin and luteolin like flavonoids were generally inhibit basophil histamine release and neutrophils beta glucuronidase release, and finally shows in-vivo antiallergic activity. The R. communis ethanolic extract decreases milk induced leucocytosis and eosinophilia and possess antiasthmatic activity due to presence of flavonoids or saponins[13]

ANTI DIABETIC ACTIVITY:-

The ethanolic extract of roots of Ricinus communis (RCRE) was investigated along with its bioassay-guided purification. By Administration of the effective dose (500mg/kg b. w) of RCRE to the diabetic rats for 20 days possess favorable effects not only on fasting

blood glucose, but also on total lipid profile and liver and kidney functions. Amongst all fractions the R-18 fraction suggests the significant antihyperglycemic activity. RCRE showed no significant difference in alkaline phosphatase, serum bilirubin, creatinine,

serum glutamate oxaloacetate transaminases, serum glutamate pyruvate transaminases and total protein which was observed even after the administration of the extract at a dose of 10 g/kg b.wt. Thus R. communis is a potent phytomedicine for diabetes[14]

WOUND HEALING ACTIVITY:-

The Ricinus communis possess wound healing activity due to the active constituent of castor oil which produce antioxidant activity and inhibit lipid per oxidation. Those agents whose inhibits lipid per oxidation is believed to increase the viability of collagen fibrils by increasing the strength of collagen fibres, increasing the circulation, preventing the cell damage and by promoting the DNA synthesis. The study of wound healing activity of castor oil was in terms of scar area, % closure of scar area and epithelization in excision wound model. Due to the astringent and antimicrobial property the tannins,flavonoids, triterpenoids and sesquiterpenes promotes the woundhealing process, which are responsible for wound contraction and increased rate of epithelialisation. The study resulted that the Castor oil showed wound healing activity by reducing the scar area and also the epithelization time in excision wound model. The comparison study of two different concentrations (5%w/w and 10%w/w) of castor oil was resulted that the 10 % w/w Castor oil ointment possesses better wound-healing property[15].

ANTI HISTAMINIC ACTIVITY:-

The ethanolic root extract of R. communis L. has the antihistaminic activity at the dose 100, 125, and 150 mg/kg body weight when inserted into the body intraperitoneally by using clonidine induced catalepsy in mice[16]

INSECTICIDAL ACTIVITY:-

The insecticidal value of the castor oil in controlling the termites which damage the wood of Mangifera indica and Pinus longifolia were examined. In comparative trials, the order of insecticidal activity was: DDT = BHC >castor oil + castor cake (1:1) >castor oil >castor leaves >castor cake >neem oil >neem leaves[17].

HEPATOPROTECTIVE ACTIVITY:-

Ricinus communis leaves ethanolic extract 250/500mg/kg body weight possesses hepatoprotective activity due to their inhibitory activities of an increase in the activities of serum transaminases and the level of liver lipid per oxidation, protein, glycogen and the activities of acid and alkaline phosphatase in liver induced by carbon tetrachloride (CCL4). The R. communis ethanolic extract 250/500mg/kg body weight also treated the depletion of glutathione level and adenosine

triphosphatase activity which was observed in the CCl4-induced rat liver. The presence of flavonoids in ethanol extract of R. communis produces beneficial effect the flavonoids have the membrane stabilizing and antiperoxidative effects. Hence the R. communis increase the regenerative and reparative capacity of the liver due to the presence of flavonoids and tannins. The anti cholestatic and hepatoprotective activity was seen against paracetamol-induced hepatic damage due to the presence of N-demethyl ricinine isolated from the leaves of Ricinus communis Linn. The whole leaves of Ricinus communis showed the protective effect against liver necrosis as well as fatty changes induced by CCL4 while the glycoside and cold aqueous extract provide protection only against liver necrosis and fatty changes respectively [18],[19]

ANTI FERTILITY ACTIVITY:-

The methanol extracts of R. communis seed possess positive preliminarily Phytochemical tests for both steroids and alkaloids. The pituitary gland releases gonadotrophins due to Sex hormones by both positive and negative feedback mechanism and also the pituitary gland block the release of luteinizing hormone (LH) and the follicle-stimulating hormone (FSH) because of the effect of combined oestrogen and progesterone in the luteal phase of the menstrual cycle. Finally it helps the inhibition of maturation of the follicle in the

ovary and prevents ovulation. The sex hormone being steroidal compounds (phytosterols) and the presence of steroids in methanol extract of Ricinus communis seed produces anti-fertility effects[20],[21].

ANTI ULCER ACTIVITY:-

The castor oil of R. communis seed possess significant antiulcer properties at a dose of 500 mg/kg and 1000 mg/kg, but at the dose 1000 mg/kg was more potent against the ulceration caused by pylorus ligation, aspirin and ethanol in rats. The result showed that the antiulcer activity of R. communis is due to the cytoprotective action of the drug or strengthening of gastric mucosa and thus enhancing the mucosal defence[22]

CONCLUSION:-

R. communis or castor plant is a widely traditionally used and potent medicinal plant amongst all the thousands of medicinal plants. The pharmacological activities reported in the present review confirm that value of R. communis is much more. It is an important source of compounds with theirs chemical structures as well as pharmacological properties. The presence of phytochemical constituents and pharmacological activities proved that the plant has a leading capacity for the development of new good efficacy drugs in future.

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