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Chemistry and Pharmacology of Aphrodisiac Plants: A Review

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ABSTRACT

Poor sexual performance is a major factor that affects the quality of life. Sexual health requires a positive approach to human sexuality. Cardiovascular leakages and diabetes are the major factors that are responsible for poor sexual performance and reproductive health. This review is aimed at reviewing the pharmacological and phytochemical properties of various medicinal plants used for the improvement of sexual performance and virility. Psychotherapeutic, pharmacological and traditional methods have been used in the management of poor sexual performance and virility. Drugs such as papaverin, alprostaldin and stimulants like apomorphine have been used to improve sexual health. The use of plant such as Panax ginseng C. A. Meyer (Araliaceae), Cannabis sativa L. (Cannabinaceae), Myristica fragrans Houtt. (Myristaceae), Mucuna pruriens Linn. (Leguminosae), Chlorophytum borivilianum Santapau & R.R.Fern. (Liliaceae), Eurycoma longifolia Jack (Simaroubaceae) and Zingiber officinale Roscoe (Zingiberaceae) have been established in the management of sexual dysfunction. The aphrodisiac activities of plants may be as result of their bioactive constituents. This research has therefore shown that the reviewed plants can be used for the management of poor sexual performance and virility.

Keywords: Sexuality; Aphrodisiacs; Health; Phytochemicals; Virility

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INTRODUCTION

Sound sexual and reproductive health is one of the major factors that contribute to happy family and good self-esteem among several men and women. Infertility has also played a major role in the disintegration of many families. Sexual health requires a positive approach to human sexuality and an understanding of the complex factors that shape human sexual behaviour [1]. Whether the expression of sexuality leads to sexual health and well-being or to sexual behaviour that put people at risk; it is determined by these factors which could also result to sexual and reproductive ill health [2]. Sexual performance anxiety is a cisgender and very real, upsetting, legitimate health and significant issue. It is no secret that our patriarchal culture at large does not understand women sexuality. Because of all the unnecessary and damaging "mystery'' surrounding female sexual desire, performance anxiety for women is not often discussed because we don't really know how to discuss it. For men, sexual performance is an ability to maintain an erection throughout the period of sexual intercourse and this ability of men's penis to stay erected hard for the duration of sex is a guarantee for a climax. For women, when sexual act creates fear, stress and worry, the

body releases stress hormones- epinephrine and norepinephrine and this worry or stress is usually created by poor sexual confidence and fear of not being able to please your partner- the fear of physical intimacy. The production of these hormones in the body causes poorly wet or dry vagina, highly tense vagina muscles which lead to difficult penetration or nearly impossible penetration and poor desire for sex [3].

The ability to procreate is enhanced through sound sexual health. Poor sexual performance is a major factor that must be overcomed for lasting peace in some marriages. Sexuality is a central aspect of being human throughout life and encompasses sex, gender and roles, sexual orientation, eroticism, pleasure, intimacy and reproduction. Sexuality is experienced and expressed in thoughts, fantasies, desires, beliefs, attitudes, values, behaviour, practices, roles and relationships. It is also important to note that while sexuality can include all of these dimensions, not all of them can be experienced or expressed. Sexuality is influenced by the interaction of biological, social, economic, political, cultural, ethical, historical, and religious and spiritual factors [4-5]. Sexual health requires a positive and respectful approach to sexuality and sexual relationships as well as the possibility of having pleasurable and safe sexual experiences free of coercion, discrimination and violence.

The concept of sexual performance varies from one individual to another. Sexual performance is naturally important to men due to their ego and instincts to procreate. The ability to satisfy a woman, the size of a man's penis which is often though wrongly associated with sexual ability is what makes up every man. Poor sexual performance causes low self-esteem and due to natural sexual instinct, humans are able to attract suitable mates and procreate. Sexual performance in male sex is fundamental in the following areas; the ability to satisfy a woman and give her orgasms and the ability to impregnate a woman [6].

Poor sexual performance can be defined in various ways based on one's concept of sexual health. The inability to give a woman an orgasm, inability to erect and sustain and erected penis, premature ejaculation, being selfish towards your lover's needs during sexual intercourse, ignoring foreplay, being too uptight during sex which can make the experience less sensual, routine and boring sex as well as poor communication constitutes poor sexual performance [7].

Poor sexual performance may also be due to erectile dysfunction which occurs as a result of both physiological and mental factors. Low sexual desire is expected to be associated with low sexual activity. Like sexual desires, sexual activity also declines with age. W.H.O estimated over 48.5 million infertile couples worldwide. Poor sexual performance can be manifested in the first three phases of sex viz; stimulation, the plateau and the climaxing phase. These manifestations are usually in the form of low libido, painful sex, premature ejaculation, poor lubrication in women which can hinder pleasurable sex and the inability to achieve orgasm.

According to [8], poor sexual performance can be attributed to numerous factors including hormonal imbalance, congenital disorders such as micropenis and peyronie's disease, smoking, excessive alcohols, small penis size or an excessive penis size, fatigue, stress, performance anxiety, past sexual trauma, age factor and poor body image. Sound sexual health can be achieved through counseling and sex therapy, medication, and lifestyle changes. Medical checkups are regularly recommended to ensure it is not due to any untreated medical condition, quitting smoking, sexual compatibility and regular kergel exercise.

In Ayurveda, poor sexual performance includes a cessation of the sexual desire owing to increased thoughts and forced intercourse, excessive use of certain substances with pungent, acid or saline taste or heat making articles which leads to loss of Saumya Dhatu (watery principle) of the organism, virile impotency resulting from inadequate semen in persons addicted to excessive sexual pleasure, diseases such as syphilis, Sahaja impotency (congenital or sexual incapacity from birth), voluntary suppression of the sexual desire by a strong man observing perfect continence and impotency due to the destruction of local Marma (spermatic cord) [9].

Male impotence or erectile dysfunction is caused mainly by cardiovascular leakages and diabetes among other factors and the use of plants or plant based products to stimulate sexual desire and to enhance performance and enjoyment is almost as old as human race itself. Androgens play significant role in male reproductive health as it acts centrally and peripherally during initiation and sexual intercourse. Stimuli such as steroids (testosterone) are known to either upregulate or downregulate androgen response [10]. Treatment of erectile dysfunction may involve psychotherapeutic approach and pharmacotherapy using drugs such as papaverin, alprostadil, vardenafil and central stimulants like apomorphine or herbal drugs with aphrodisiac activity [11].

Natural products are available in texts of Ayurveda for their spermatogenic and virility potential acivities. Ayurvedic aphrodisiac therapeutics is grouped into vajikarana (pharmacological) and rasayana (non-pharmacological products)

Aphrodisiac Plants

The term 'aphrodisiac' was derived from the Greek word 'aphrodite' which represents a symbol of love and beauty. Over the years, a large number of natural remedies have played different roles as aphrodisiacs in different cultures and civilizations. There is a natural interest of human beings for substances that stimulate libido, potency, virility, and sexual pleasure as it takes care of sexual desires, ejaculation, orgasm and erectile dysfunction. An aphrodisiac literally includes substances that have played significant roles in the management of sexual dysfunction and which also improves sexual behaviour and satisfaction in humans and other animals [12].

According to Ayurveda, aphrodisiacs are classified in the following categories; drugs which increase the quantity of semen or stimulate the production of semen such as *Microstylis wallichii*, *Roscoea procera*, *Polygonatum verticillatum*, *Mucuna pruriens* and *Asparagus racemosus*, drugs which purify and improve the quality of semen for example, *Saussurea lappa*, *Myrica nagi*, *Sesamum indicum*, *Vetiveria zizanoides* and *Anthocephalus cadamba*, drugs which improve ejaculatory functions for example, *Strychnos nux vomica*, *Cannabis sativa*, *Myristica fragrans* and *Cassia occidentalis*, drugs delaying the time of ejaculation or improving ejaculatory performance such as *Sida cordifolia*, *Asparagus racemosus*, *Cinnamomum tamala*, *Anacyclus pyrethrum*, *Mucuna pruriens* and *Cannabis sativum*, drugs arousing sexual desire, namely. *Withania somnifera*, *Asparagus rcaemosus*, *Datura stramonium*, *Anacyclus pyrethrum*, *Hibiscus abelmoschus* and opium [13](Table 1).

The use of plant based products to stimulate sexual desires and enhance performance and pleasure is almost as old as human race itself since man cannot alienate self from using plants and plant based products for the treatment of his ailments. Aphrodisiacs are basically grouped into two; psychophysiological stimuli (visual, tactile, olfactory and aural) preparations and internal preparations such as food, alcoholic drinks and love portion. Aphrodisiacs can also be categorized based on their mode of action into three groups; substances that increase libido (sexual desire and arousal), substances that increase sexual potency (effectiveness of erection) and substances that increase sexual pleasure [14].

From a scientific standpoint, many historically "powerful" aphrodisiacs may have had such strong results due to mere belief or their powers by users, while nowadays, because of science, many foods are considered to be helpful in your sex life because of the nutrients, vitamins and minerals which they contain. Many herbs have been scientifically proven to increase sexual desire and much more. Plants which possess ability to boost sexual performance and virility include the following; Almonds, Asparagus, Avocado, Banana, Coconut, Dates, Garlic, Mango, Mushroom, Olive, Onion, Sesame seeds, Parsely, Wheat grass, Mints, Aloe, and Celery among others [15].

Apart from medicinal plants, several other drugs of metal and mineral origin are also described in ayurveda for their spermatogenic and virility activities. These include varatika (calcium), gold, etc, Animal products such as meat soup of cock, peacock, swan or sparrow; semen of crocodile, etc. have been reported to possess aphrodisiac activity [16] (Figure 1-10).

Mechanism of action of aphrodisiac plants

Penile erection is controlled by the balance between the factors leading to the contraction and relaxation of smooth muscles of the corpus cavernosa, these effects may occur directly on the central nervous system and/or on the peripheral nervous system by the alteration of blood flow to the genitalia. Neurochemical systems such as norepinephrine, dopamine, serotonin, acetylcholine and histamine work together for increase in sexual arousal.

There are different mechanisms of action of aphrodisiacs such as nitric oxide (NO)-based mechanism of action and androgen based mechanism of action. The neurotransmitter NO drives the relaxation of the penile vasculature and trabecular smooth muscles which play significant roles in penile erection. Relaxation of the trabecular smooth muscles of the corpus cavernous leads to decreased vascular resistance and increased blood flow to the penis. A decrease on outflow is ensurd by the compression of the subtunical venules. Both increased inflow and decreased outflow results to penile engorgement and erection. Vasolidation is mediated by NO from the vascular endothelium of the sinusoids and nonadrenergic, noncholinergic and cavernosal nerves (Figure 10-20).

Androgens such as testosterone play crucial role in the development of secondary sexual characters such as epididymis, vas deferens, seminal vesicle, prostate and the penis. The conversion of testosterone to estradiol in the hypothalamus increases sexual functions. Penile erections are also caused by cyclic adenosine monophosphate pathway (cAMP) through the mediation of corporal smooth muscles and respective enzymes and proteins such as prostalglandin and the protein kinase G which causes smooth muscles relaxation and also increases the concentration of Ca2+ which induces a loss of the contractile tone of the penile smooth muscles and increase blood flow in the cavernous body thus yielding and erection [17-19] (Figure 20-29).

Table 1:Medicinal Plants used for the improvement of sexual performance and virility

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
1	*Allium sativum* L	Liliaceae	Garlic	The alcoholic extract of *A. satium* increased sexual behaviour through the activities of sulfated compounds, peptides, flavonoids and phenolics	Allicin increases blood flow to sexual organs through nitric oxide synthase	Peptides, sulfated compounds, steroids, flavonoids, volatile oils with sulfated compounds like alliin, ajoenes, enzymes, minerals and vitamins	Peptides, steroids, terpenes, flavonoids, volatile oils and vitamins	[20, 21]
2	*Alpinia galangal* L	Zingiberaceae	Galangal, blue ginger, Thai ginger	Methnaolic extract of *A. galangal* showed increase in serum testosterone levels at 300 mg/kg/day		Spectroscopic analysis of sample have revealed the presence of 1'S'-1'-acetoxychavicol acetate, 1'S'-1'-acetoxyeugenol acetate, 1'S'-1' hydroxychavicol acetate, trans-p- hydroxycinnamaldehyde, trans-p-coumaryl alcohol, trans-p hydroxycinnamyl acetate, and trans-p-coumaryl diacetate, 1, 8-cineole, β-bisaboline and β-selinene. Whereas α-selinene, farnesene, 1,2-benzenedicarboxylic acid, germacrene-B and pentadecane; The rhizome also contains flavonoids, some of which have been identified as kaemperol, kaempferide, galangin and alpinin.hydroxy-1,8-cineole glucopyranosides, (1R,2R,4S) and (1S,2S,4R)-trans-2-hydroxy-1,8-cineole β-D-glucopyranosides and (1R,3S,4S)-trans-3-hydroxy-1,8-cineole β-D glucopyranoside	Coumarin, terpenoids, flavonoids, volatile oils, Phenols	[22, 23]
3	*Anacardium ocidentale* L.	Anacardiaceae	Cashew	In a study to determine the aphrodisiac activity of the oils from *Anacardium ocidentale* L seeds and shell, the result showed significant increase in sexual parameters		2-hydroxy-6-pentadecylbenzoic acid, The ethanolic extract of the nuts of *Anacardium ocidentale* L contains phytochemicals such as phenols, carbohydrates, proteins and xanthoproteins as well as volatile oils, 2,6-dihydroxybenzoic acid from cashew apple, myristicin, kaempferol, rhamnetin, cyanidin, peonidin, delphinidin which are flavonoid compounds. Other isolated compounds are 2-hydroxy-6-pentadecylbenzoic acid, cardinal and salicyclic acid, ethyl gallate, hyperoside (quercetin-3-galactoside) and β-sitosterol (Fadeyi OE et al., 2015). A new biflavonoid-C-glycoside named occidentoside, also the known (-) salipurposide and beta-sitosterol, new biflavonoid-C-glycoside named occidentoside, also the known (-) salipurposide and beta-sitosterol	Carbohydrates, phenols, flavonoids, steroids, proteins	[24]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
4	*Anacyclus pyrethrum* L	Asteraceae	Arkakara	Administration of 50 mg/kg and 100 mg/kg of aqueous extract in albino rats showed significant anabolic and spermatogenic effects. In a separate study, petroleum ether extract had marked nfluence on body weight and accessory sexual organs weight as compared with arachis oil	This could be partly explained by its vasorelaxant properties which may be caused by an increase in NO production in vascular bed and a decrease in its destruction	Alkyl amides, pyrethrins, inulin, sesamine, hydrocaroline, pellitorine, volatile oils such as It is also composed of 2-phenyl ethylamine, anacylin, β-biotol, salvia-4 (14)-en-1-one. Eudesma-4(15),7-diene-1-ol and β-himachalol; the essential oil also contains germacreme D, germacreme-4(15),5,10(14)-trien-1-a-ol, caryophyllene oxide, cedryl acetate, eudesma-4(15),7- diene-1-β-ol and spathuleno	Amides, Volatile oils	[25-27]
5	*Butea frondosa* L	Papillionaceae	Flame of the Forest, Bastard Teak, Parrot Tree	The extract (400 mg/kg body wt./day) was administered orally by gavage for 28 days. Mount latency (ML), intromission latency (IL), ejaculation latency (EL), mounting frequency (MF), intromission frequency (IF), ejaculation frequency (EF) and post-ejaculatory interval (PEI) were the parameters observed before and during the sexual behavior study at day 0, 7, 10, 14, 21, and 28. The extract reduced significantly ML, IL, EL and PEI ($p < 0.05$). The extract also increased significantly MF, IF and EF ($p < 0.05$). These effects were observed in sexually active and inactive male rats.		Fixed oil 18 %, Water soluble albuminoid substances 19% and glucose 6 %. Fatty acids isolated from this oil are orleic l inoleic, lenorlenic, palmitic, stearic, arachidic, behenic and lingo cleric acid. Q hydroxy-1-methyo allophonic acid, 15-hydroxy pentasonic acid and 1-carboxy methoxy-2-carboxy hydrazine have been isolated from the seed coat. Seed has shown the presence of alkaloid monspermine from the alcoholic extract of the seeds are identified palasonin & palasonin-N-Phenyl imidine. Aqueous methanolic extract contains a triazine compound, 4-carbo-methoxy-3-dioxo-hydro-1,2,4-triazine 4.Carboxymethoxy 3.6 dioxo hydro 1, 2, 4, triazine	Amino acids, alkaloids, fixed oils	[28]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
6	*Caesalpinia benthamiana* (Baill) Herend α Zarucchi	Fabaceae	Caesalpinia	The methanolic extract exhibited an accelerator effect by decreasing the latent time. The oral administration of aqueous extract of *Caesalpinia benthamiana* showed significant increase in mounting frequency and intromission frequency at the dosage of 50 mg/kg		The petroleum ether exract of the bark have yielded cassane diterpenes with antibacterial activity such as deoxycaesaldekarine C, benthaminine I and benthaminine 2, The aqueous extract contains flavoinoids, phenols, anthraquinones such as gallic acid, resveratrol; the chloroform and n-butanol extract contains methyl gallate, shikimic acid-3-O-gallate, 1-O-methyl-D-chiroinositol, (-)-epicatechin, (-)-epictaechin-3-O-gallate and kaempferol-3-(6''-galloyl) glucoside.	Terpenes, benthamine, fatty acids, flavonoids, alkaloids	[29]
7	*Cannabis sativa* L	Cannabinaceae	Marijuana, hemp	In India's ayurveda and Chinese unani medicine, Cannabisis used to overcome impotence and raise libido and as a general cure for the disease.		Narcortic resin, cannabidiol, cannabidiol-carboxylic acid, cannabigerol and cannabichromene, cannabipinol and cannabidivarin, phloroglucinol β-D-glucoside, tetrahyrocannabinol,	Cannabinoids, Phenol, alkaloid, flavonoid, volatile oils	[30]
8	*Chlorophylum borivilianum* Santapau & R.R. Fern	Liliaceae	Safed Musli	In a study of the aqueous extract of dried roots of Safed Musli in rats, there was increase in libido, sexual vigour and sexual arousal at 250 mg/kg. The sudy supported treatment of premature ejaculation and oligospermia	The chemical structure of stigmasterol is related to that of testosterone and mainly contributes to its aphrodisiac potentials; hecogenin produces anabolic hormone	Isolated compounds include stigmasterol and hecogenin which are responsible for its antioxidant power, anticancer and aphrodisiac activities. Chlorophytoside-1, fatty acids, eicosadienoic	glycosides, saponins, fatty acids, hydrocarbons	[31, 32]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
9	*Citrulllus lanatus* (Thunb.) Matsum. & Nakai	Cucurbitaceae	Water Melon	The effect of red watermelon flesh extract on male sexual behaviour has been determined. In the research, the suspension of the flesh extract was administered on doses 100, 500 and 1000 mg/kg to different groups of male rats (n=5) daily for 22 days. The result showed that oral administration of watermelon flesh extract caused significant increase in mounting frequency, intromission frequency and ejaculatory latency. Watermelon flesh extract did not produce undesirable side effects on the male rats and thus its short term use is apparently safe	Citrulline improves blood drive to the genital regions and plays a significant role in the relaxation of blood, a major tool in high sexual performance	Watermelon contains bioactive agents such as citrulline, β-carotene and lycopene which have been used in the management of prostate cancer.	Carotenoids	[33]
10	*Eurycoma longifolia* Jack	Simaroubaceae	Tonkat Ali	Standardized extract F2 at 25 mg/kg and its quassinoids improved rat spermatogenesis, improved testosterone steroidgenesis. standardised water extract at 400 mg/day for six weeks on testosterone, epitestosterone (T:E) ratio showed significant difference between supplementation and placebo. Treatment with Tongkat Ali extract at 400 mg/day for 5 weeks resulted to increase in free and total testos terone concentration and muscular force in men and women	Improves spermatogenesis by affecting the hypothalamic-pituary-gonadal axis. Improves testosterone by inhibiting aromatic conversion of testosterone to ostrogen and may also involve phosphodiestrase inhibition. The extracts of tongkat Ali affects male infertility by suppressing α-2HS glycoprotein expression which thereby increases testosterone level and insulin sensitivity	Quassinoids such as eurycomanone, eurycomnol, pasakbumin-B, hydroxylklaineanones, β-carboline alkaloids, canthin-6-one alkaloids, eurycomalactone, laurycolactone, biphenyl neolignan and steroids, alkaloids such as 5,9-dimethoxycycanthin-6-one, 9,10-dimethoxy-3-methylcanthin5,6-dione have been reported. Squalene derivatives such as longilene peroxidase, teurilene, eurylene and 14-deacetylleurylene have also been isolated	phenols, quassinoids, alkaloids, volatile oils, hydrocarbons	[34-40]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
11	*Ginkgo biloba* L.	Ginkgoaceae	Gingko	According to some researches, extracts of *Ginkgo biloba* may also help in psychological conditions by easing stress, mild depression and anxiety-major causes of poor sexual performance thereby improving the mood for sexual pleasure. *Ginkgo biloba* extract have been used in traditional Chinese medicine to improve blood circulation. *Ginkgo biloba* constituents have a thinning effect on the blood besides helping to improve the muscle tone in the walls of the blood vessels	Improved blood circulation results to an increase in the amount of oxygen in the blood and to all major organs of the body including the heart and brain thereby resulting to an increased arterial inflow to arterial tissues through arteries and veins without obstructing systemic blood pressure. This enhanced supply of blood to sex organs is crucial in maintaining strong erection	GC-MS, HPLC-MS, HPLC-RI analysis of samples have led to the characterization of ginkgolides A, B, C, J, M with cage structures involving a tertiary butylgroup and six membered rings including a spiro-nonane system, a tetrahydrofuran and three lactone groups. 33 flavonoids have been isolated from the leaves including amento flavone, quercetin, myricetin, sesquojaflavone, Ginkgetin, Isorhamnetin, etc. Ginkgolic acids have also been isolated; the albumen of the seed also contains neurotoxic 4'-O-methylpyridoxine (ginkgotoxin), etc	Steroids, flavonoid, ginkgosides	[41]
12	*Hibiscus sabdariffa* L. (Hs)	Malvaceae	Zobo, Roselle	Pharmacology of the testicular effects of subchronic administration of *H sabdariffa* L (Hs) calyx aqueous extract in rats has been determined. Doses of 1.15, 2.30, and 4.60g/kg for 12 weeks showed in significant change in the absolute and relative testicular weights; significant decrease in the epididymal sperm count and induced testicular toxicity	It decreases the viscosity of the blood and stimulates internal peristalsis	Several compounds have been isolated from different parts of *H sabdariffa* L (Hs) including β-carotene, vitamin C, riboflavin, thiamine, and nutrients such as protein, carbohydrates and minerals like calcium and iron. *H sabdariffa* L (Hs) is composed chiefly of organic acids, anthocyanins, polysaccharides and flavonoids. Spectroscopic analysis off the aqueous extract of *H sabdariffa* L (Hs) have yielded citric acids, hydroxycitric acid, hibiscus acid, malic acid and tartaric acids; oxalic acid as minor compounds. Delphinidin and cyanidin based anthocyanins including delphinidin-3-saambubioside (Hibiscin), cyanidin-3-sambubioside (gossypicyanin), cyanidin-3,5-diglucoside, delphinidin, etc.. have been reported. Isolation and characterization of the flower extract have yielded flavonoids such as hibiscetin-3-glucoside, (hibiscitrin), sabdaritin, gossytrin, quercetin, luteolin, chlorogenic acid, protocatechuic acid; sterols such as β-sitosterol and ergosterol have been isolated. Other isolated compounds includes gallocatechin, caffeic acid, gallocatechin acid, ellagic acid, methyl gallate, kaempferol-3-O-rutinosie,, myrcetin, kaempferol-3-glucoside, tiliroside etc	Carotenoids, vitamins, flavonoids, minerals, amino acids	[42, 43]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
13	*Lepidium meyenii* Walpers	Cruciferae	Viagra of Peru, Maca	In a research, treatment of rats with maca at high altitudes prevented high altitude spermatogenic disruption. In a separate study, 1500 mg/kg or 3000 mg/kg *p.o* showed no significant effect on serum levels of leutinizing and follicle stimulating hormone.	Maca improves stamina and endurance, mood, and libido and erectile capabilities due to the presence of arginine which boosts nitric oxide which relaxes blood vessels, the same basic effect Viagra produces	Macamides such as benzylglucosinolate, benzylisocyanate, benzyl nitrile, benzyl alcohol, benzylaldehyde, benzylamine, hexanal, linoleic acid, N-benzylhexadecanamide, alkaloids, fatty acids, amino acids	Macamides, alkaloids, amino acids, fatty acids	[44, 45]
14	*Mimosa tenuiflora* (Wild.) Poir	Momisaceae	Jurema	A research into the spermatic characteristics of *M tenuiflora* on ram showed no significant differences (P>0.05) for the progressive motility, spermatic strength and morphology among the sheep with or without *M tenuiflora*. The result indicated that *M tenuiflora* does not influence negatively on spermatci characteristics of the sheep		Two alkaloids have been isolated from *M tenuiflora* and includes 5-hydroxy-typtamine and N,N-dimethyltryptamine. *M tenuiflora* is also composed of yuremanine and two chalcones; kukulkan A (2’.4’,-dihyroxy-3’-4-dihydroxychalcone), kukulkan B (2’,4’,4- trihydroxy-3-methoxychalcone). *M tenuiflora* is also composed of the steroids campesterol-3-O-β-D-glucopyranosyl, stigmasterol-3-O-β-D-glucopyranosyl and β-sitosterol-3-O-β-D-glucopyranosyl. Saponins such as mimonoside A, mimonoside B, mimonoside C have been isolated. Five 2-phenoxychromones ("uncommon" flavonoids), the tenuiflorin A [5,7-dihydroxy-2-(3-hydroxy-4-methoxyphenoxy)-6 methoxychromone], tenuiflorin B [5,7-dihydroxy-2-(4-hydroxy-3-methoxyphenoxy)-6-methoxychromone] and tenuiflorin C [5,7-dihydroxy-2-(3-hydroxy-4-methoxyphenoxy)-chromone], along with 6-demethoxycapillarisin and 6-demethoxy-4'-O-methylcapillarisin were isolated from the leaves of *M. tenuiflora*. These uncommon "flavonoids" exhibited an unusual ether linkage between the B and C ring	Alkaloids, steroids, flavonoids	[46]
15	*Mucuna pruriens* L	Leguminosae	Devil beans	In different texts of ayurveda, *M. pruriens* is most commonly used in aphrodisiac formulations. At 70 mg/kg, treatments significantly improved testosterone quality, ameliorated psychological stress and improved sperm count	Producing a dose-dependent increase in follicle stimulating hormone and leutenizing hormone which increases the number of eggs released at ovulation by the action of L-DOPA and dopamine	L-DOPA, serotonin, mucunain, arachidic acid, behenic acid, genistein, glutamic acids, betacarboline, β-sitosterol, cysteine, dopamine, lysine, tryptamine, riboflavin	Alkaloids, amino acids, saponins, vitamins	[47-50]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
16	*Musa* species L	Musaceae	Banana, plantain	Aqueous extract of *M. paradisiaca* root on testicular function parameters on male rats at 25, 50 and 100 mg/kg enhanced the testosterone dependent normal functioning of the testes. *M. sapientum* contain bromine, norepinephrine, dopamine and serotonin in the peel and pulp. norepinephrine and dopamine elevate blood pressure while serotonin stimulates the blood vessels of the intestine	Increase in blood Circulation	Bromine, rubidium, strontium, saponins, norepinephrine, dopamine, serotonin, vitamin B_6, vitamin a, c and D and natural glucose, fructose. Several compounds such as acyl steryl glycoside such a sitoindoside-I, sitoindoside-II, sitoindoside-III, sitoindoside-IV and steryl glycosides such as sitosterol, *myo-inosityl-ß*-D-glucoside have been isolated from fruits of *M. paradisiaca,* A bicyclic diarylheptanoid, *rel*-(3*S*, 4a*R*,10b*R)*-8-hydroxy-3-(4-hydroxyphenyl)-9-methoxy-4a,5,6,10b-tetrahydro-3*H*-naphthol[2,1-*b*]pyran, and 1,2-dihydro-1,2,3-trihydroxy-9-(4-hydroxyphenyl) naphthalic anhydride, 1,7-bis(4-hydroxyphenyl) hepta-4(*E*), 6(*E*)-dien-3-one have also been isolated, cyclomusalenol, cyclomusalenone	Saponins, alkaloids, vitamins, glycosides, triterpenes, sterols	[51, 52]
17	*Myristica fragrans* Houtt	Myristaceae	Nutmeg	50% ethanolic extract showed significant increase in aphrodisiac properties in mice such as increase in mating frequency, libido and potency. It has also been used in Unani medicine for the treatment of sexual disorders	Stimulation of the nervous system by myristicin	A-pinene, camphene, ρ-cymene, sabinene, β-phillandiene, γ-terpinene, limonene, myrcene, linalool, 3-methyl-4-decan-1-ol, fixed oils like mysristic, stearic, palmitic, oleic and olenolic acids, Licarin B and malabaricone C	Essential oils, fixed oils, unsaturated aliphatic hydrocarbon	[53-56]
18	*Ocimum gratissimum L*	Labiatae	Ocimum, Scent leaf	Oral administration of extracts of Ocimum at 100, 250 and 500 mg/kg to 6 groups of male rats once a day for seven days showed significant increase in mounting frequency, intromission frequency, erection and aggregate penile reflexes		*Ocimum gratissimum* L consist of several essential oils such as thymol, eugenol, methyl charvical, gratissimol, pentoses, hexoses, uronic acid, alkaloids, tannins, flavonoids, methyl eugenol, cis-ocimene, trans-ocimene, pinene, camphor, germacrene-D, transcarypophyllene, farnesene, l-bisaboline, p-cymene, γ-terpene, α-trans sabiene hydrate, 1,8-cineole, linalool, β-salinene, methylisoeugeneol, geraniol	Volatile oils, alkaloids, tannins	[57]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
19	*Panax ginseng* C. A. Meyer	Araliaceae	Ginseng berry	PGRg3 significantly produced significant and sustains increase in sexual activity of normal male rats. Improvement in all forms of sexual dysfunction including erectile dysfunction and premature ejaculation	Ginsenosides enhances acetylcholine-induced and transmural nerve stimulation-activated relaxation associated with increasing tissue cGMP mediated by the release of NO	Triterpene glycosides called ginsenosides. Alkanes, alkenes, sterols, fatty acids, carbohydrates, flavonoids, organic acids and vitamin	Saponins, hydrocarbons, flavonoids and vitamin	[58-61]
20	*Passiflora incarnate* L.	Passifloraceae	Passion flower	The aphrodisiac effect of the methanolic extract of *P. incarnate* L has been determined in mice. The result showed significant aphrodisiac properties in male mice at all doses- 75, 100 and 150 mg/kg with 100 mg/kg having the highest activity		Several compounds such as flavonoids and other phenolics have been isolated from *P. incarnate* L such as apigenin and luteolin, isovitexin, vitexin, isoorientin, orientin and saponarin. Also isolated from *P. incarnate* L includes schaftoside, isoschaftoside, isovitexin-2'-O-β-glucoside and isoorientin-2-O-β-glucoside. NMR and GC/MS spectral analysis have also yielded vicenin-2 and lucenin 2. Indole alkaloids such as Harman, harmine, harmalol, and harmaline have also been isolated from *P. incarnate* L. other isolated compounds includes γ-benzopyrone derivative maltol, ralfinoses, sucrose, D-glucose, D-fructose and other essential oil containing hexanol, benzyl alcolhol, linalool, 2-phenyl alcolhol, 2-hydroxy benzoic acid methyl ester, carvine, eugenol, isoeugenol, and phytol among others	Phenolics, alkaloids, sugars	[62-65]

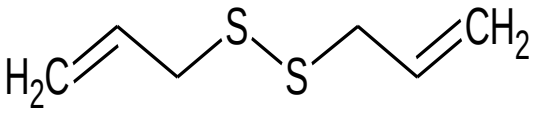
S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
21	*Pausinystalia yohimbe* (K. Schum.) Pierre ex Beille	Rubiaceae	Yohimbe	A 1998 study of yohimbine showed that it could be considered as a pharmacologic agent. The result showed that yohimbine is superior to placebo in the treatment of erectile dysfunction. In another study, there was significant increase in the number of men that reached organsm with 20 mg dose of yohimbine	Circulation of blood to sex organs thereby enhancing sexual arousal and reduction of psychological conditions by easing stress, mild depression and anxiety	*P. yohimbe* is composed of numerous indole alkaloids and tryptamine alkaloids such as yohimbine, ajmalicine, ajmaline, corynatheine, deserpine, mitragynine, rauwolscine, spegatrine, reserpine, and rescinnamine, as well as α-yohimbine, β-yohimbine, Pseudoyohimbine, Alloyohimbine, Ajmaline, ajmalicine, 19-Dehydroyohimbine, Dihydrocorynantheine, Dihydrosissirikin, Tetrahydromethylcorynantheine, 2,4-Dimethyl-1,3-dioxane, 3,4-Dihydroxy-2,3-dihydro-4H-pyran-4-one, palmitic acid, n-Hexadecanoic acid of palmitic acid, 2-Methylene-11-hexadecynoic acid, linoleic acid and Octadecanoic acid	Alkaloids, fatty acids	[66]
22	*Pedalium murex* L	Pedaliaceae	Caltrops, Gokhru	In a study against ethanol induced infertility in male rats 200 mg/kg and 400 mg/kg of petroleum ether extracts showed significant increase in mating, mounting behaviour, total body weight, sperm motility and percentage of pregnancy	increase in sexual behaviour	Phytochemicals such as diosgenin and vanillin, quercetin, ursolic acid, caffeic acid and amino acids such as glycine, histidine, tyrosine, threonine, aspartic acid and glutamic acid and fatty acids, fatty acids such as triacontanoic acid	Saponins, flavonoids, amino acids and fatty acids	[67, 68]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
23	*Peganum harmala* L	Zygophyllaceae	African rue, harmel	In a study to determine the aphrodisiac potential of *P. harmala* L seeds, it was reported that the seeds showed significant changes in the weight of the accessory glands, semen quality and histology of the organs involved in reproductive functions without affecting the metabolic functions		The plant is composed of several β-carboline alkaloids such harmaline, harmine, harmalol, harmol and tetrahydroharmine in the seeds and roots, Quinazoline alkaloids such as vasicine and vasicinone have been isolated from the flowers and stem, A new β-carboline alkaloid, harmalidine and pegamine have been isolated from the seeds and aerial parts of *P. harmala*. The presence of a new β-carboline alkaloid characterized as I-thioformyl-8-β-D-glucopyranoside-bis-2,3-duhydro-isopyridinopyrrol and four new flavonoids including 7-O-rhamnoside, 7-O-6’’-O-glucosyl-2’’-O-(3’’-acetylrhamnosyl) glucoside, 7-O-(2’’-O-rhamnosyl-2’’-O-glucosylglucoside) and glycoflavone 2’’-O-rhamnosyl-2’’-O-glucosylcytisoside (Sharaf M et al., 1997). Spectroscopic analysis of the seeds extract have led to the iusolation of two new anthraquinones glycoside such as 3,6-dihydoxy-8-methoxy-2-methylanthraquinone (peganone 1) and 8-hydroxy-7-methoxy-2-methylanthraquinone (peganone 2)	Alkaloids, flavonoid, antraquinones	[69]
24	*Piper guineense* Schum and Thonn	Piperaceae	West African pepper, Benin pepper, Uziza pepper	In a study to determine the effect of aqueous extract of dry fruits of *P. guineense* on male fertility parameters of adult male Sprague Dawley rats, the result showed an increase in body weight and serum testosterone level. It was concluded that the extract of dry seeds of *P. guineense* at 200mg/kg for 4 weeks and 8 weeks respectively had a positive impact on male fertility parameters and showed no deleterious effects on male fertility. In a separate study, the effects of *Afromomum Melegueta* and *P. guineense* on sexual behaviour of male rats, *P. guineense* at 122.5mg/kg stimulated male sexual behaviour by an increase in penile erection index and frequency of	The extract enhanced orientation of males towards females by increasing mounting and ano-genital behaviour	The chemistry of *P. guineense* has yielded several compounds. GC-MS spectroscopic analysis of the plant has shown the presence of alkaloids, flavonoids, saponins, phenols, tannins, etc. Several compounds have been isolated including piperine, elemicine, myristicin and safrole which have strong antimicrobial properties. GC-MS spectroscopic analysis of the fruit and leaf has yielded *P. guineense* 39 new compounds which are isobutyl, pyrrolidyl and piperidyl amide alkaloids. The isolated compounds are; N-pyrrolidyl-I-acetylamide, N-piperidyl-I-aceytlamide, N-isobutyl-2,4-octadienamide (Pellitorine), N-piperidyl-Isobutyl-3,4-dimethyoxybenzoic acid amide, N-pyrrolidyl-3-methoxycinnamoylamide, N-Isobutyl-2,4-tetradecadienamide, N-piperidyl-2,4-dodecadienamide, N-Isobutyl-5- (3,4-methylenedioxyphenol)-2-pentenamide, N-isobutyl-5(3,4-methylenedioxyphenyl)-2,4-pentadienamide (Piperlonguminine), N-piperidyl-5- (3,4-methylenedioxyphenyl)-2-pemtenamide, Cyclostachine A and Cyclostachine B, Cycloguineense A and Cycloguineense B, N-piperidyl-2-decenamide, N-pyrrolidyl-I-cinnamylamide, N-isobutyl-2,4-tridecadienamide, N-	Alkaloids, flavonoids, saponins, phenols and tannins	[70-72]

				intromission and ejaculation		pyyrrolidyl-2,4-dodecadienamide, N-pyrrolidyl penntadecanoylamide, N-isobutyl-2,4-hexadecdienamide, N-piperidyl pentadecanoylamide, N-piperidyl-9- octadecenamide, etc. Further isolation and purification have of *P. guineense* have shown the presence of essential oils which is composed of numerous compounds such as β-pinene, myrcene, α-phellandiene, α-pinene, sabinene, 2,3-carene, limonene, α-humulene, α-zingiberene, β-caryophyllene, caryophellene oxide, guaiol, α-cardinol, geraniol, α-terpineol, β-elemene, methyl eugenol, etc. These were identified through GC-MS spectroscopic analysis		
S/N	**Plants**	**Family**	**Common name**	**Pharmacology**	**Mechanism of action**	**Chemistry**	**Class of isolates**	**References**
25	*Syzygium aromaticum* (L) Merr. and Perry	Myrtaceae	Clove	50% ethanolic extract of clove in normal male rats showed significant increase in mounting frequency, intromission frequency, erection, quick flips, and significant reduction in mounting latency. The N-hexane extract at 15, 30, and 60 mg/kg for 35 days in Parkes (P) strain mice showed increase in aphrodisiac activities		The flavonoids taxarixetin 3-O-β-D-glucopyranoside, ombuin 3-O-β-D-glucopyranoside and quercetin, Clove oil contains sequiterpenesOther compounds isolated includes 5, 7-dihydroxy-2-methylchromone-8-C-β-D-glucopyranoside, biflorin, kaempferol, rhamnocitrin, myricetin, gallic acid, ellagic acid and oleanolic acid glucoside	volatile oils, flavonoids, phenols, fatty acids	[73-75]
26	*Terminalia catappa* L	Combretaceae	Sea almond	1500 mg/kg dose had a significant aphrodisiac effect characterized by increase in sexual viguor but no effect on libido. In high doses of 3000 mg/kg, all determined sexual parametrs were inhibited. The plant showed aphrodiasiac properties at low dosage	improved sexual behaviour	triterpenoid compound 4,4,6a,11,11,14b-heptamethyl-1,2,3,4,4a,5,6,6a, 7,8,8a,9, 10,11,12,12a,14,14a,14b-icosahydropicen-3-ol, HPLC-PDA analysis of the leaves have yielded the presence of ursolic acid, Asiatic acid, squalene, but no caffeine, flavonoids such as isovitexin, vitexin and rutin, gallic acid, hydrolysed tannins, puncalagin anomers as a major component. Punicalin, terflavin A and B, tergallagin, tercatain, chebulagic, geranin, granato B and covilagin. Ellagitannins and gallotannins have been isolated. The hydroalcoholic extract of the leaves have yielded α and β-anomers of puncalagin and ellagic acid	Fatty acids, alkaloids, terpenoids	[76]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
27	Tribullus terrestris L	Zygophyllaceae	Devil's thorn, pucture vine, caltrop, yellow and goathead	In ayurveda, puncture vine has been used for the treatment of erectile dysfunction. *T. terestris* at 5 mg/kg in adult spraque Dawely rats on sexual behaviour and intracavernous pressure showed increase in mount intromission and ejaculation latency representing an improvement in sexual character.in another study, 100 mg/kg of the test drug was proven anabolic. They help to regulate sexual energy levels and sexual strength by increasing the percentage of free available testosterone levels for men and they even affect pregnenolone, progesterone, and estrogen	The aphrodisiac activity of protodioscin has been suggested to be effective through androgen enhancement and nitric oxide release from nerve endings of corpus cavernous tissue	The plant contains Dioscin, protodioscin, and diosgenin, Saponins such as glucopy-ranosyl galactopyrans, ruscogenin, hecogenin, diosgenin; Polysaccharides; and Sterols including sitosterol, campesterol have been isolated. Flavonoids such as kaempferol, kaempferol glycosides, quercetin, and Fatty acids such as palmitic, steatric, oleic, and Linoleic acid; Tannis; Potassium salts have all been reported	Saponins, sterols, flavonoids, fatty acids, tannins,minerals	[77-79]
28	*Turnera diffusa* (Wild.) ex Schult	Turneraceae	Damiana	*T diffusa* extract at 80 mg/kg also significantly increased the percentage of male achieveing one ejaculatory series and resuming a second one and s significant decrease in post ejaculatory interval.	These effects can be attributed to the presence of phytochemicals such as caffeine (alkaloid) or butine and other flavonoids	*T diffusa* is composed of numerous phytochemicals. Over 35 compounds have been isolated from *T diffusa* comprising flavonoids, terpenoids, saccharides, phenolics and cyanogenetic derivatives. It is composed of tricin, chrysoeriol and Echinacin. These compounds were characterized as luteolin 8-*C*-*E*-propenoic acid, luteolin 8-*C*-β-[6-deoxy-2-*O*-(α-l-rhamnopyranosyl)-*xylo*-hexopyranos-3-uloside], apigenin 7-*O*-(6‘ ‘-*O*-*p*-*Z*-coumaroyl-β-d-glucopyranoside), apigenin 7-*O*-(4‘ ‘-*O*-*p*-*Z*-coumaroylglucoside), syringetin 3-*O*-[β-d-glucopyranosyl-(1→6)-β-d-glucopyranoside], and laricitin 3-*O*-[β-d-glucopyranosyl-(1→6)-β-d-glucopyranoside]. Their structures were determined by spectroscopic and chemical methods. It is also composed of quercetin and vitexin	Flavonoids, terpenoids, saccharides	[80-82]

S/N	Plants	Family	Common name	Pharmacology	Mechanism of action	Chemistry	Class of isolates	References
29	*Zingiber officinale* Roscoe	Zingiberaceae	Ginger	Scientific studies have shown increased libido but its activity was lower than Pasakbumni at 140 mg/kg BM. In another study to determine the effects of the extracts of ginger as an aphrodisiac, there was significant increase in aphrodisiac activity in the n-hexane and chloroform fraction respectively at 25 or 50 mg/kg	Increase in intercavernosal pressure, a reliable positive index of erectile dysfunction	Ginger contains 1-2% volatile oils, 5-8% resinous matter, starch and muscilage. Major constituents are monoterpenes such as β-phillandiene,(+)-c amphene, cineole, ciral and borneol. Sesquiterpene hydrocarbons like zingiberene, β-bisboline, α-farnesene and ar-curcumene as well as sesquiphillandiene and the sesquiterpene alcohol zingiberol and gingerol which is responsible for its pungency. Others are ginger diol, gingerenone, dialdehyde and shogaols	Volatile oils	[83]



Allicin

Figure 1: *Allium sativum* L

Figure 2: *Alpinia galangal* L

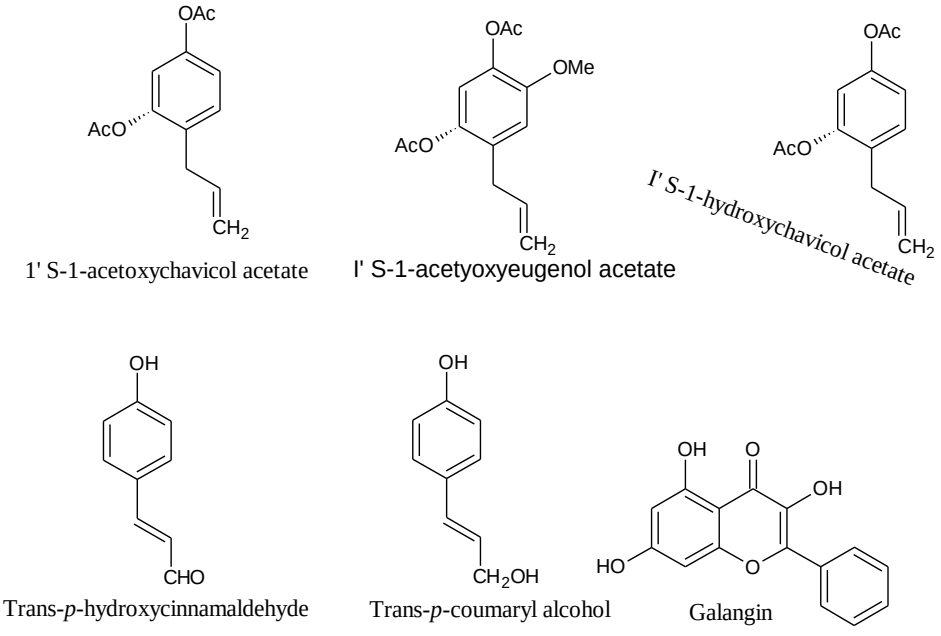


Figure 3: *Anacyclus pyrethrum* L

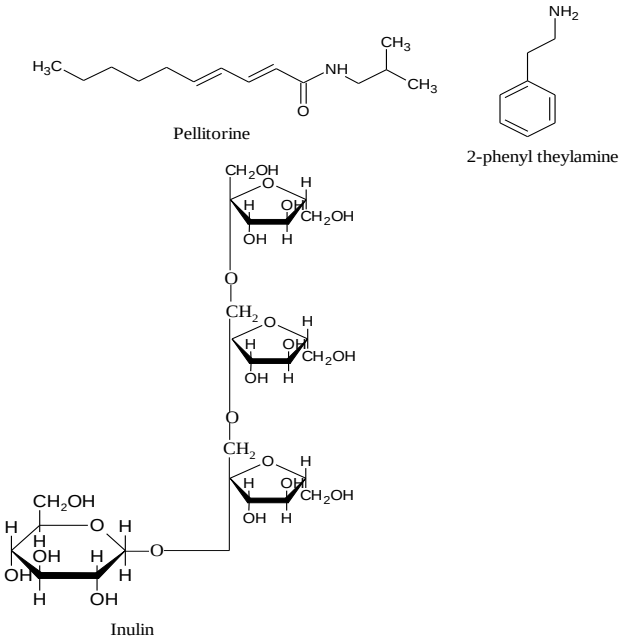


Figure 4: *Caesalpinia benthamiana* (Baill) Herend α Zarucchi

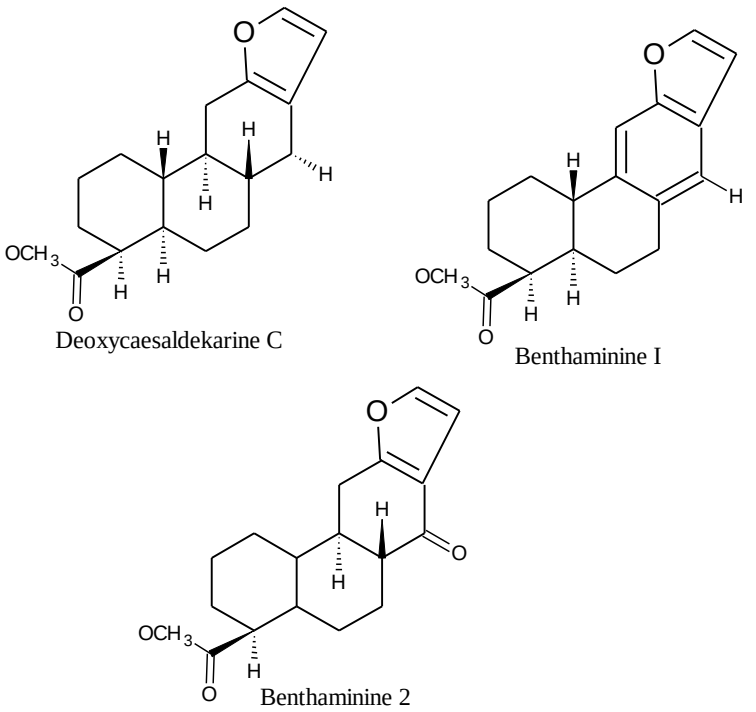


Figure 5: *Cannabis sativa* L

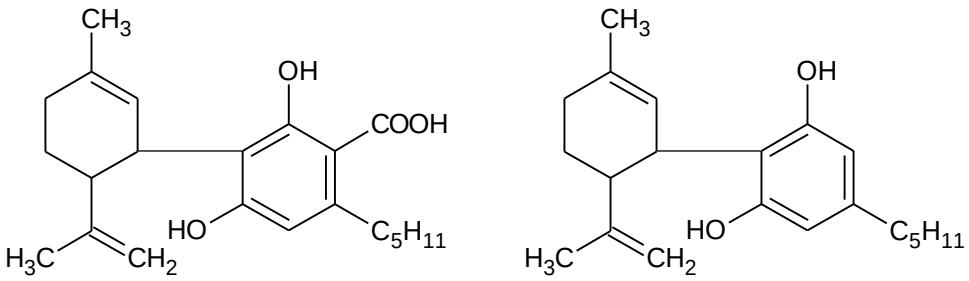


Figure 6: *Chlorophylum borivilianum Santapau* & R.R. Fern

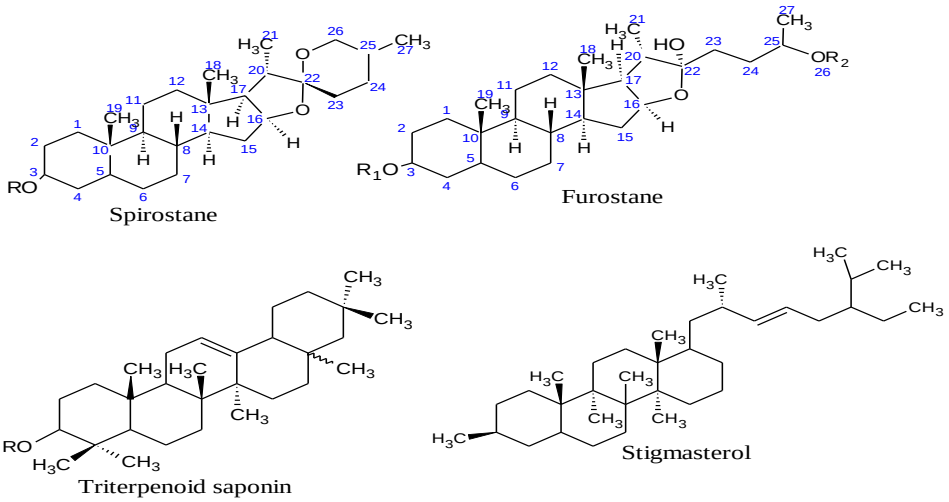


Figure 7: *Eurycoma longifolia* Jack

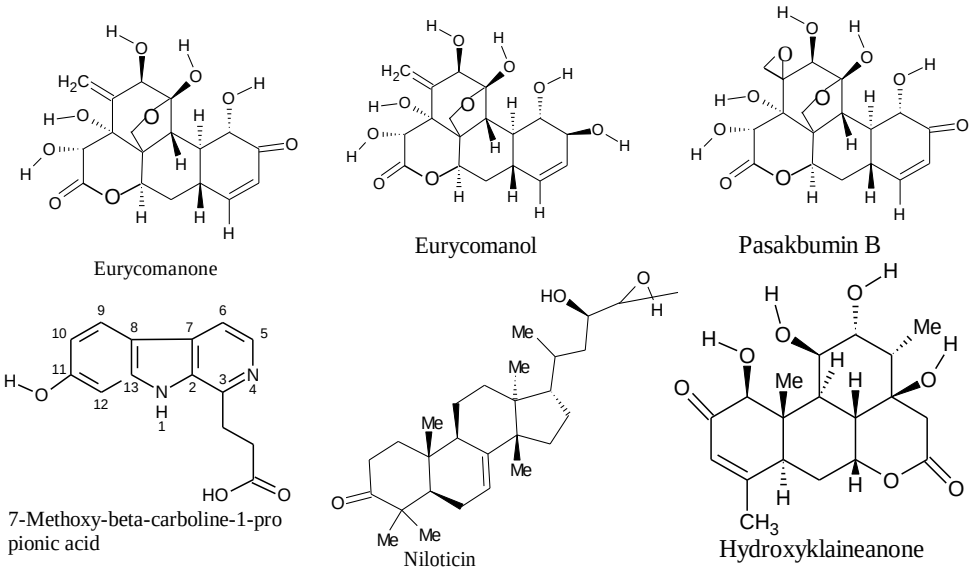


Figure 8: *Lepidium meyenii* Walpers

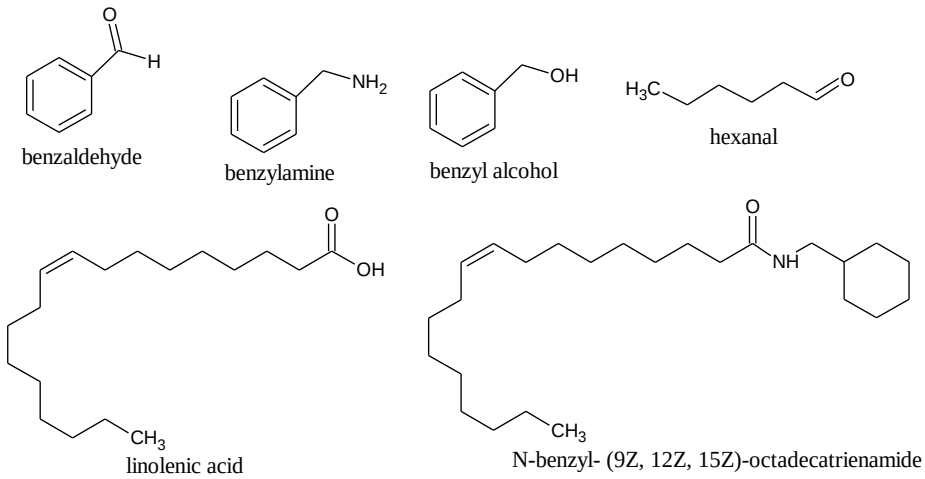


Figure 9: *Mucuna pruriens* L

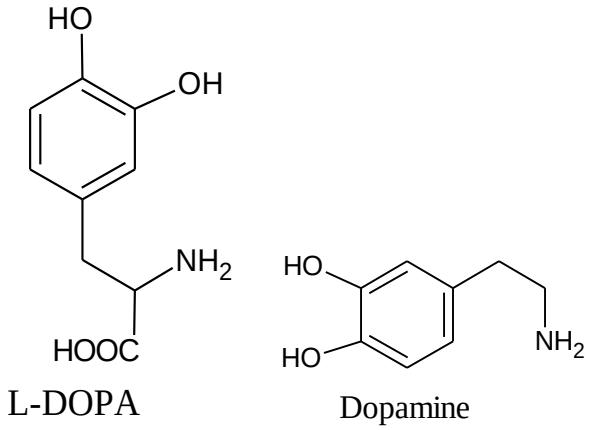


Figure 10: *Musa species L*

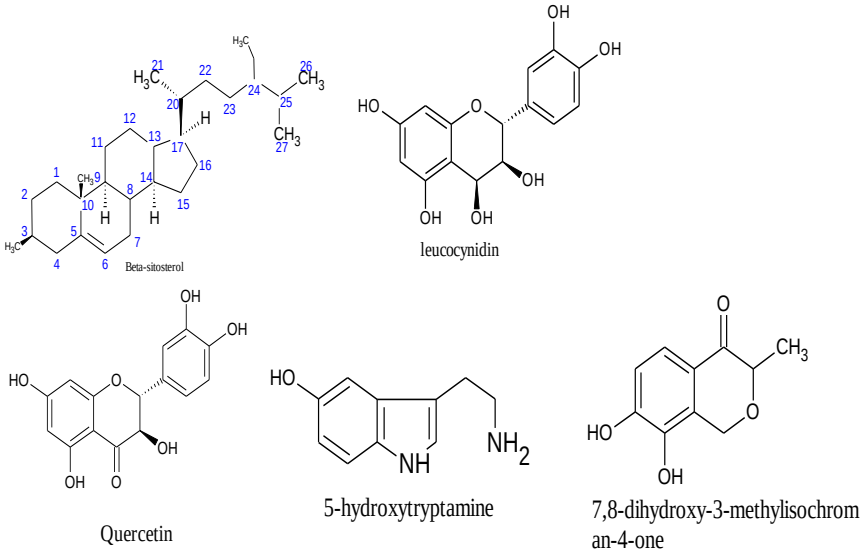


Figure 11: *Myristica fragrans* Houtt

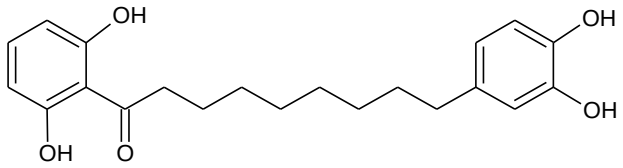


Figure 12: *Ocimum gratissimum L*

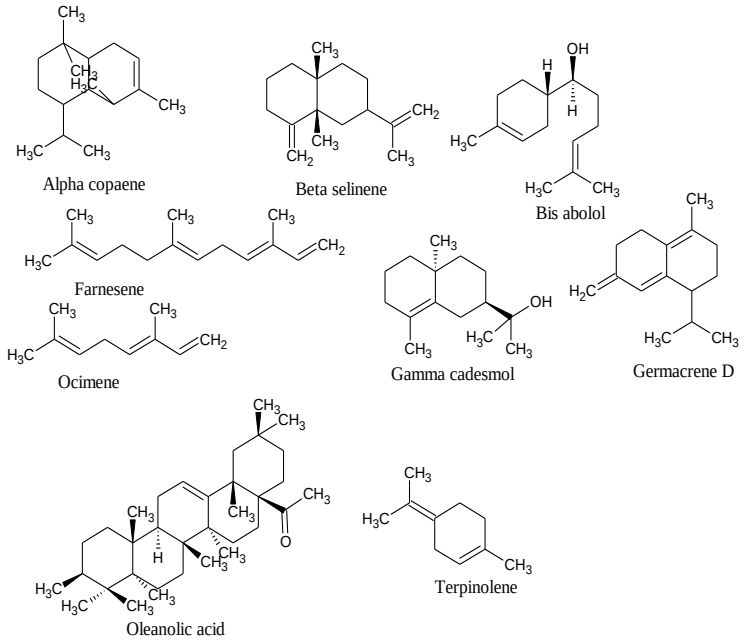
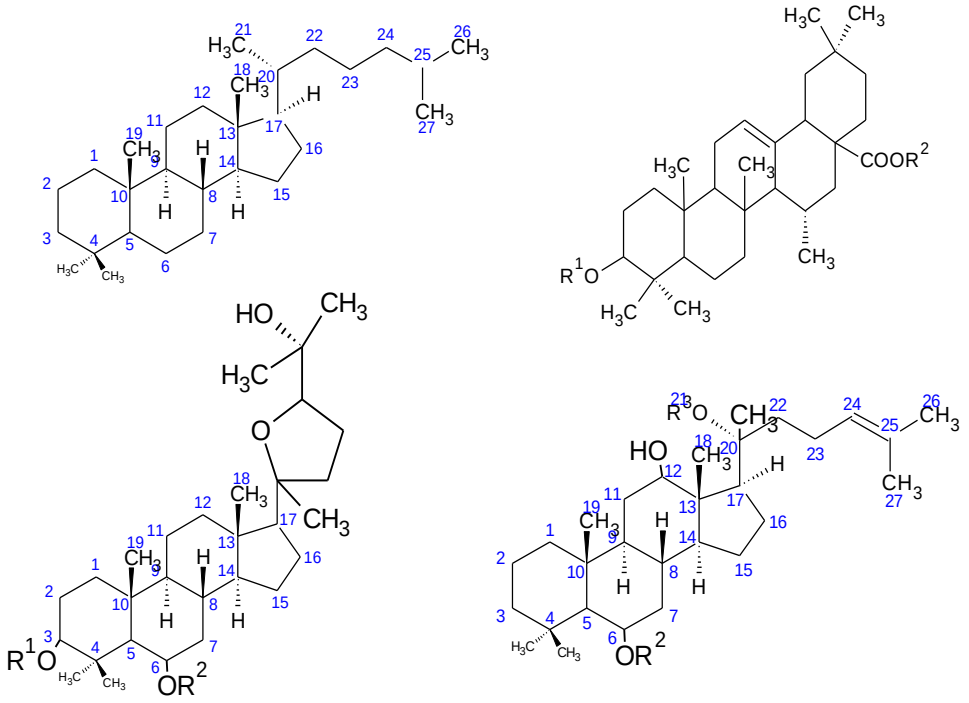


Figure 13 : *Panax ginseng* C. A. Meyer



Saponin basic structures from berry

Figure 14 : *Pausinystalia yohimbe* (K. Schum.) Pierre ex Beille

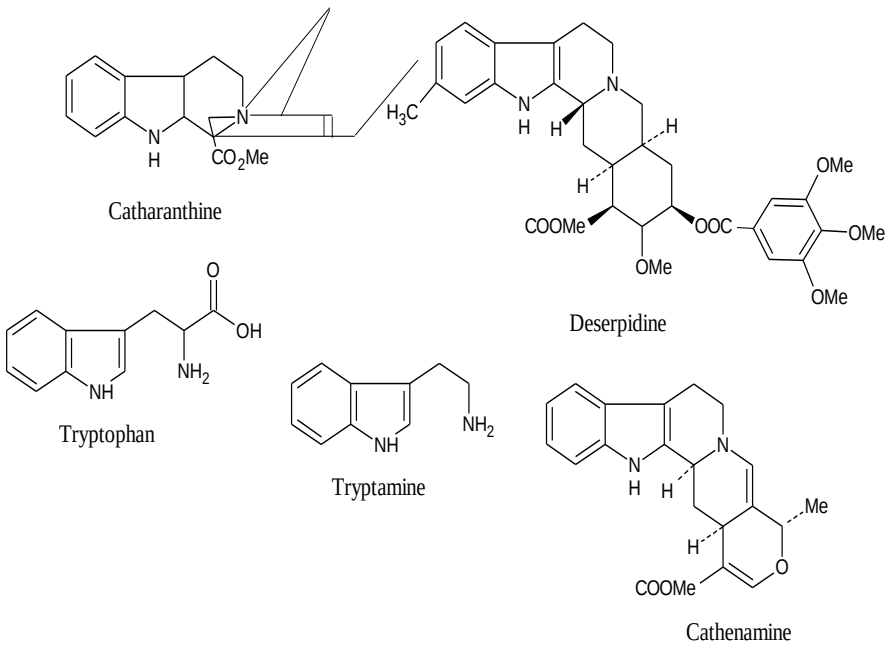


Figure 15 *: Pedalium murex* L

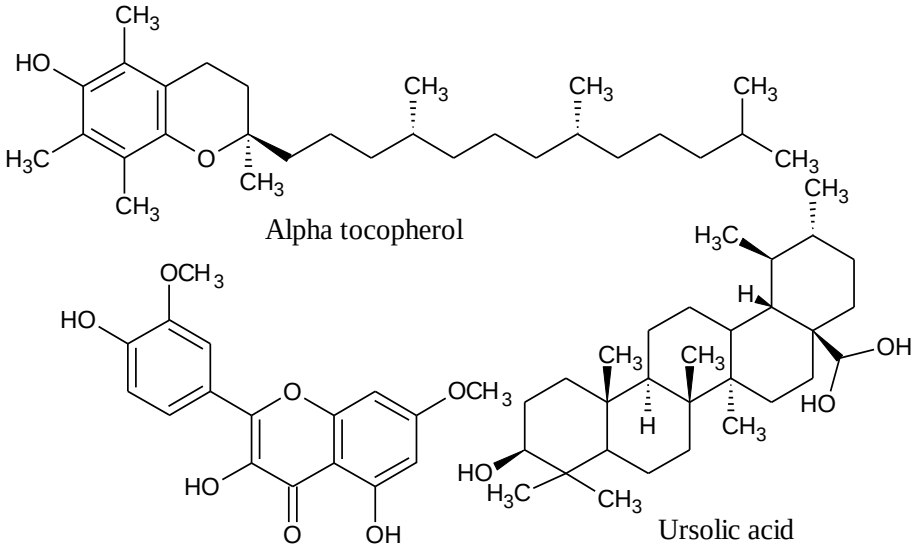


Figure 16 : *Syzygium aromaticum* (L) Merr. and Perry

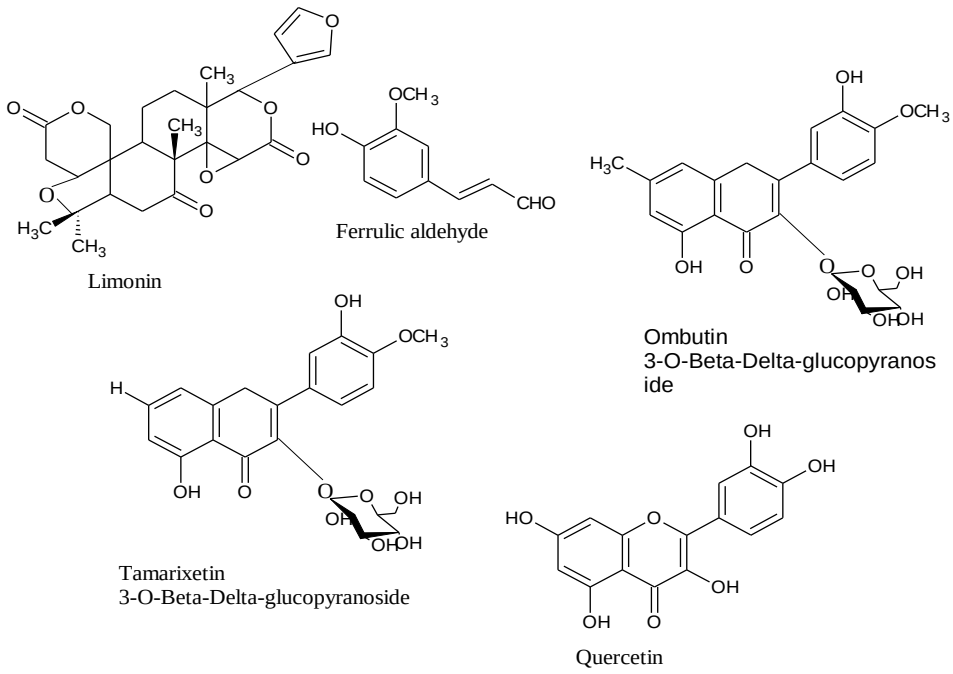
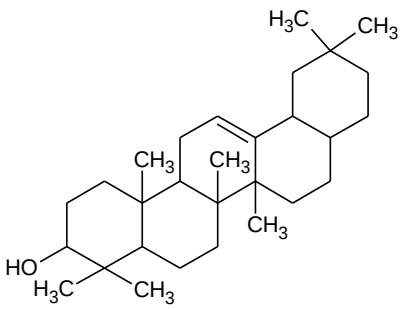


Figure 17 : *Terminalia catappa* L



4,4,6a,11,11,14b-heptamethyl-1,2,3,4,4a,5,6,6a,7,8,8a,9,10,11,12,12a,14,14a,14b-icosahydropicen-3-ol

Figure 18 : *Tribullus terrestris* L

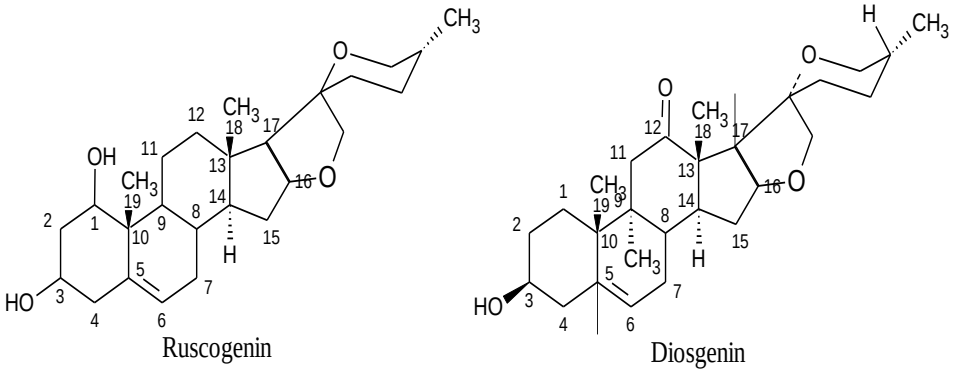


Figure 19 : *Zingiber officinale* Roscoe

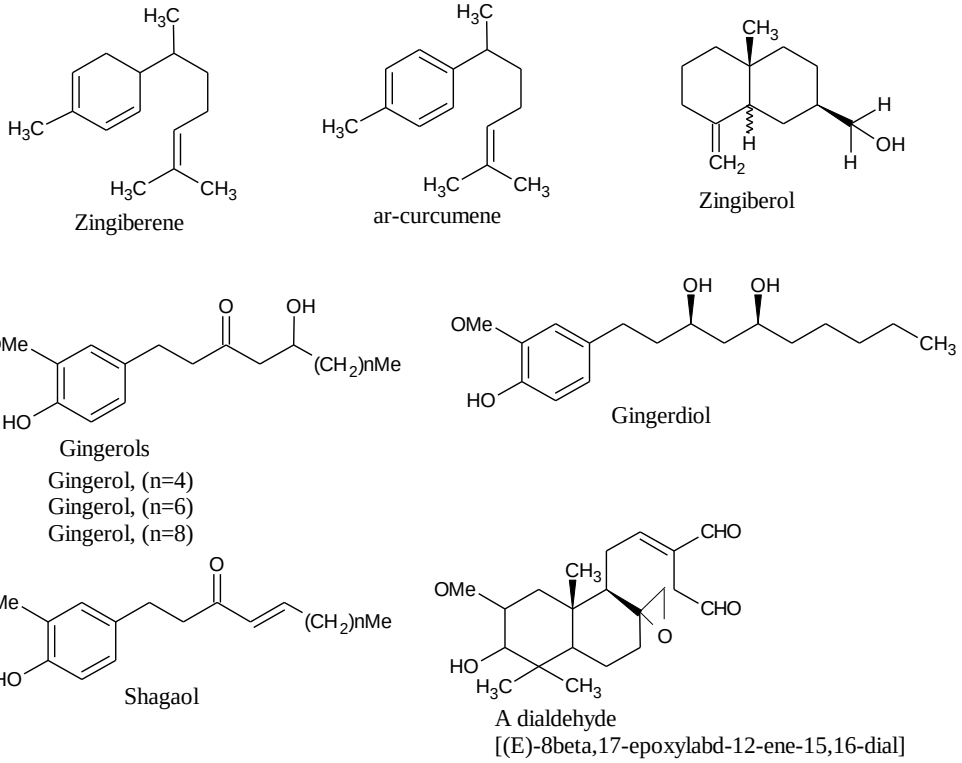


Figure 20 : *Anacardium occidentale* L

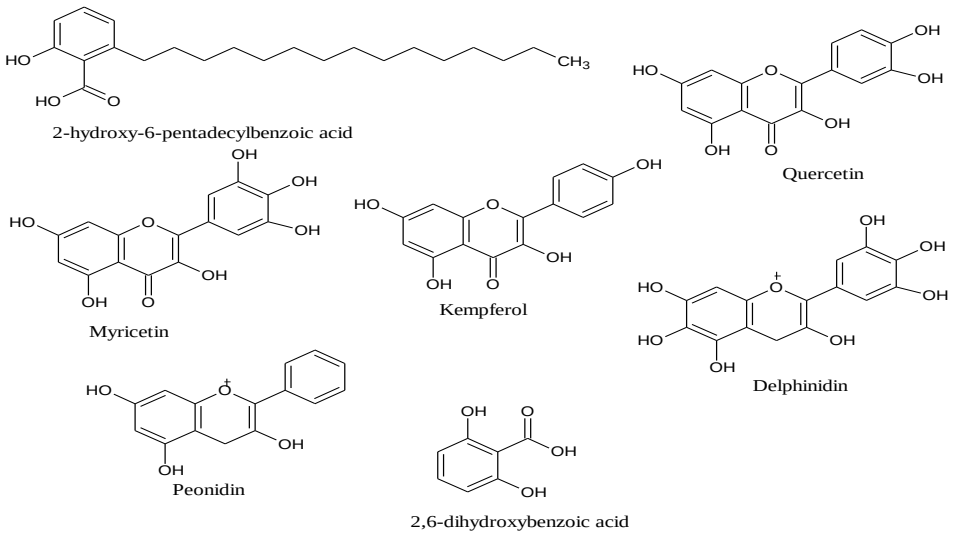
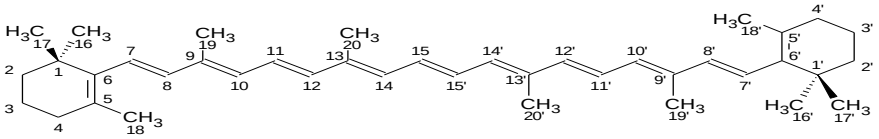
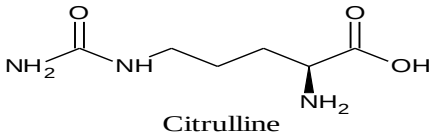


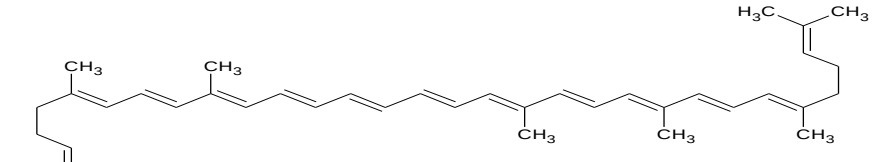
Figure 21 : *Citrulllus lanatus* (Thunb.) Matsum. & Nakai



Beta-carotene

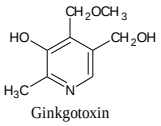


Citrulline

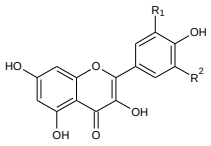


Lycopene

Figure 22 : *Gingko biloba* L

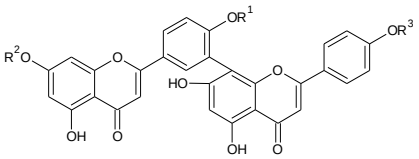


Ginkgotoxin



Flavonol structures

Kaempferol derivatives: R^1=OH; R_2=H
Quercetin derivatives: R_1=OH; R_2=H
Myricetin derivatives: R_1=OH; R_2=OH
Isorhamnetin derivatives: R_1=OMe; R_2=H



Biflavonoid structures

	R_1	**R_2**	**R_3**
Amentoflavone	H	H	H
Bilobetin	Me	H	H
Sesquojaflavone	H	Me	H
Ginkgetin	Me	Me	H
Isoginkgetin	Me	H	Me
Sciadopitysin	Me	Me	Me

Figure 23 : *Peganum harmala*

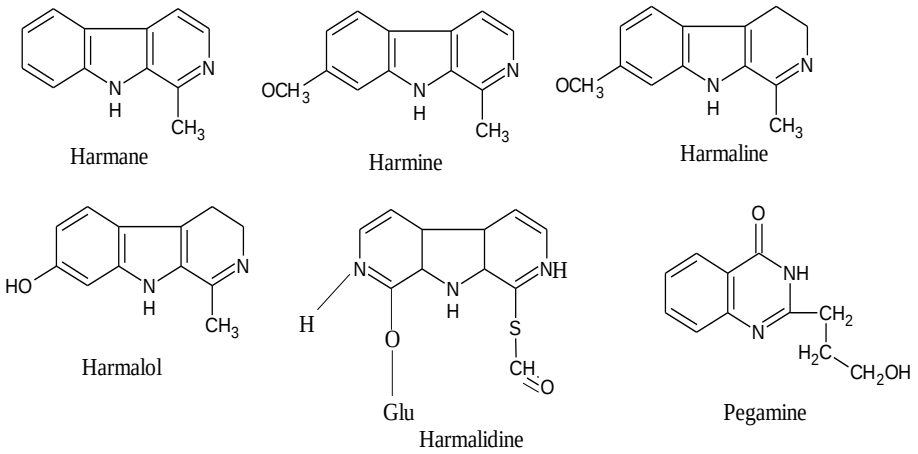
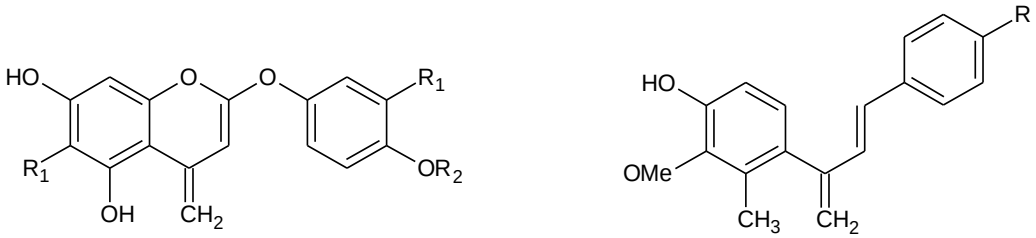


Figure 24 : *Mimosa tenuiflora* (Wild.) Poir (Momisaceae)



R= OMe= R_1=OH; R_2= Me-Tenuiflorin A
R=R_1=OMe; R_2=H- Tenuiflorin B
R=H; R_1=OH; R_2=Me- Tenuiflorin C
R=H; R_1=H; R_2= H-6- Dimethoxycapilarisin
R=H; R_1=H; R_2=Me-6-Dimethoxy-4-O-methylcapilarisin

R= OMe - Kukulkan A
R= OH- kukulkan B

Figure 25 : *Turnera diffusa* (Wild.) ex Schult (Turneraceae)

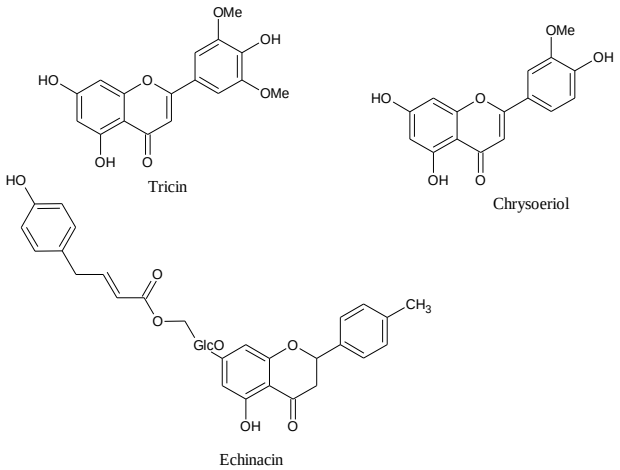


Figure 26 : *Passiflora incarnate* L.

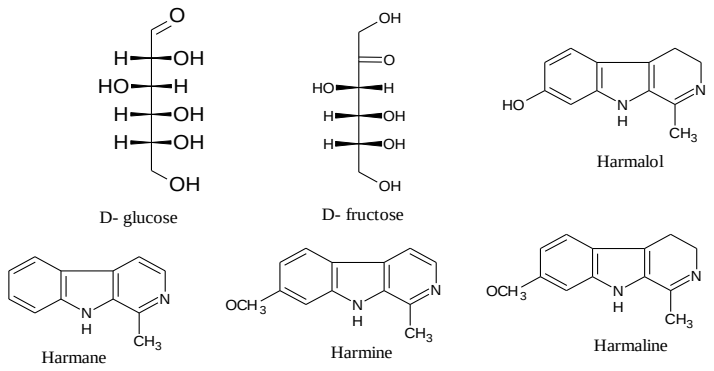


Figure 27 : *Piper guineense* Schum and Thonn (Piperaceae)

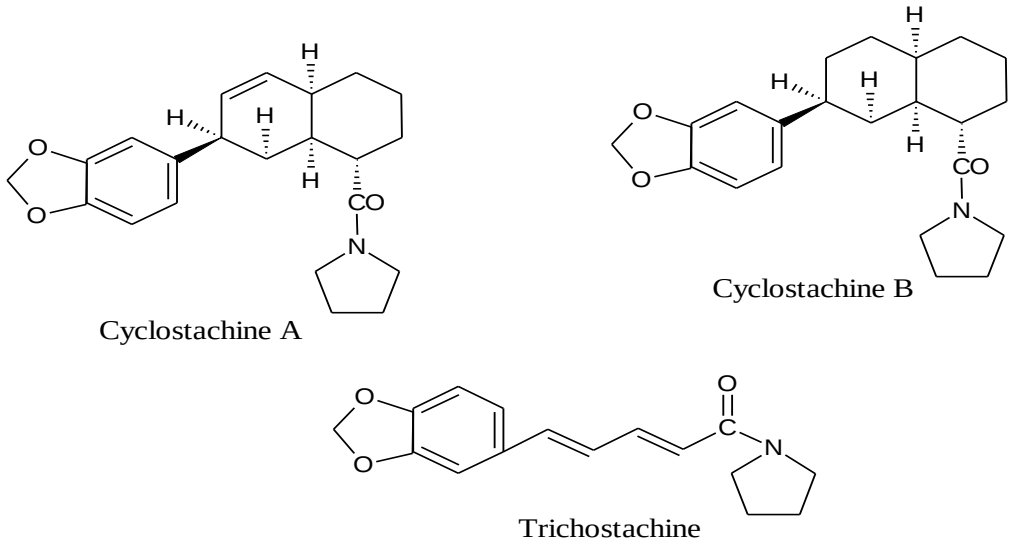
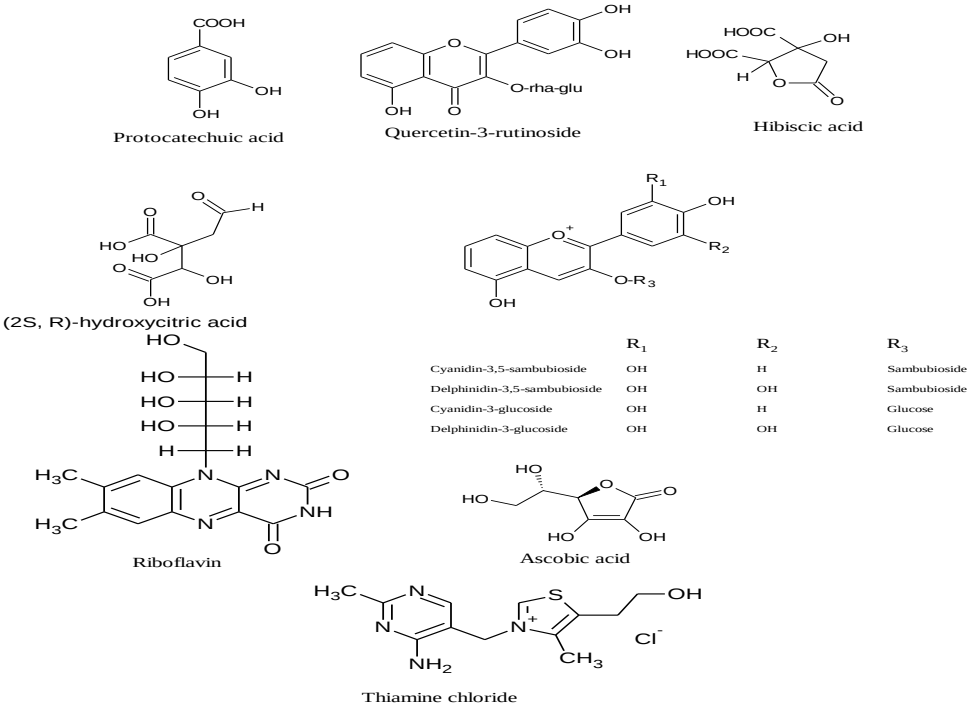
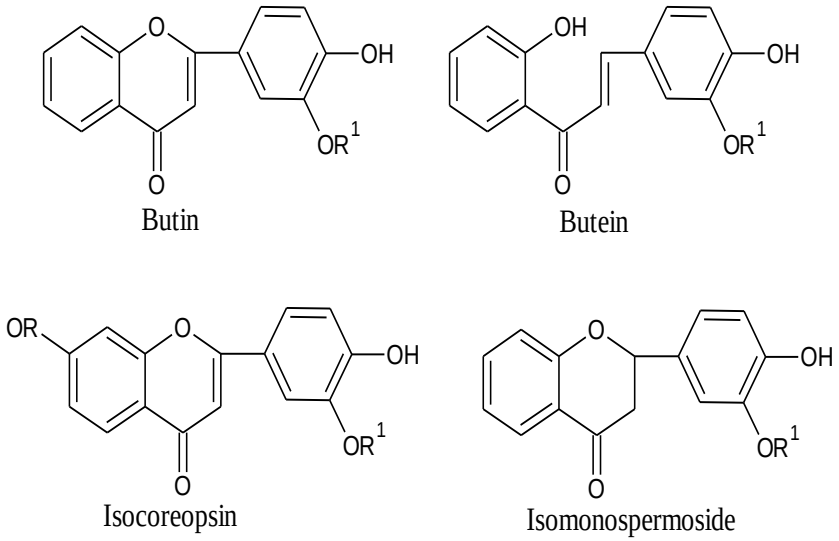


Figure 28 : *Hibiscus sabdariffa* L. (Hs) (Malvaceae)



	R_1	R_2	R_3
Cyanidin-3,5-sambubioside	OH	H	Sambubioside
Delphinidin-3,5-sambubioside	OH	OH	Sambubioside
Cyanidin-3-glucoside	OH	H	Glucose
Delphinidin-3-glucoside	OH	OH	Glucose

Figure 29 : *Butea frondosa* L



CONCLUSION

Poor sexual performance is a significant factor in human life since it affects man in numerous ways. It is significant that issues surrounding poor sexual performance and virility are unraveled in various economies of the world. Several plants have proven useful in the management of sexual disorders throughout history, even herbs and spices have been used to enhanced sexual activities in various parts of the world. There is great need for substances that are used to treat sexual dysfunction in humans. The use of aphrodisiacs is prominent in many countries of the world including Nigeria.

Aphrodisiacs can be used directly or indirectly in the management of sexual dysfunction and improvement of virility. Demand for natural aphrodisiacs require further studies to properly understand their effects on human and safety profile, uses of aphrodisiacs can be harmful due to unavailable data on safety, mechanism of action and knowledge to support their extensive use in procreation. Isolation and characterization of the active constituents of plants used in improvement of sexual performance and virility can cause a dynamic change in the world today. It is pertinent that the phytochemistry of all plant used to treat sexual dysfunction and which also plays a significant role in the improvement of virility is studied. This review emphasizes pharmacology and phytochemistry of all reviewed plants.

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