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Table of contents

Research Articles



Efficient micro-propagation protocol for *Cissus quadrangularis* L. (?target=ijor:mpijpri&volume=4&issue=1&article=001)
Poonam Garg, C. P. Malik

Effect of nutrients and sucrose on microrhizome production and diosgenin accumulation in cultures of *Costus speciosus* Sm. *in vitro* (?target=ijor:mpijpri&volume=4&issue=1&article=002)
Satheesh George, K. P. Unnikrishnan, A. V. Raghu, S. P. Geetha, Indira Balachandran

Biology of *Glyphodes negatalis* Walker (Lepidoptera: Pyralidae): A New Insect Pest of *Karanj, Pongamia pinnata* (L.) Pierre in south Gujarat (India) (?target=ijor:mpijpri&volume=4&issue=1&article=003)
Sushil Kumar, S. M. Chavan, K. H. Kabade

Serological and PCR detection of *Garlic common latent virus* associated with garlic accessions in India (?target=ijor:mpijpri&volume=4&issue=1&article=004)
D. Pramesh, S. Islam, Jasvir Singh, V. K. Baranwal

Identification of a potyvirus associated with mosaic disease of *Catharanthus roseus* and its histopathogical effects (?target=ijor:mpijpri&volume=4&issue=1&article=005)
Deepa Srivastava, Naveen Panday, A. K. Tiwari, Kalawati Shukla

Elemental analysis of some Indian medicinal plants by Particle induced X-ray emission (PIXE) technique (?target=ijor:mpijpri&volume=4&issue=1&article=006)
B. M. Rajeshwari, J. P. Sharangouda, T. R. Rautary

Physiological effects of *Myristica fragrans* extract on West African dwarf bucks (?target=ijor:mpijpri&volume=4&issue=1&article=007)
K. M. Okukpe, A. A. Adeloye, F. D. Abayomi, O. I. Alli, M. A. Belewu, O. A. Adeyina

Antibacterial activity of *Nigella sativa* seed and honey mixture against *Staphylococcus aureus* Mastitis (?target=ijor:mpijpri&volume=4&issue=1&article=008)
Ahmed Moussa, Djebli Noureddine, Aissat Saad

Short Communications

Chemical constituents of volatile oil of *Tagetes minuta* L. cultivated in Uttarakhand Himalayas (?target=ijor:mpijpri&volume=4&issue=1&article=009)
Hema Lohani, Harish C. Andola, Ujjwal Bhandari, Nirpendra Chauhan, Daya Sagar Pal

In vitro multiplication of *Rauvolfia serpentina* (L.) Benth. ex Kurz - An endangered medicinal plant (?target=ijor:mpijpri&volume=4&issue=1&article=010)
Satheesh George, S. P. Geetha, Indira Balachandran

Production of a new mixed herbal medicine for minor Aphthous Ulcers (?target=ijor:mpijpri&volume=4&issue=1&article=011)
Shahin Gavanji, Behrouz Larki, Mohsen Doostmohammadi, Forogh Mortezaeinezad

Effect of ethyl methane sulphonate (EMS) on alkaloid contents in *Ageratum conyzoides* Linn. (?target=ijor:mpijpri&volume=4&issue=1&article=012)
Poonam Agarwal

Top

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Research Article

hysiological effects of *Myristica fragrans* extract on Vest African Dwarf Bucks

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ABSTRACT

ifteen (15) West African Dwarf Bucks (WAD) of initial weights of 10kg were used in an experimental design to ssess the effect of *Myristica fragrans* extract on the sexual function of the West African Dwarf Bucks. They were ubcutaneously administered 0.01, 0.02, 0.03ml/kg body weights of *Myristica fragrans* extract. The control and tandard group were given 0.01ml/kg body weights of normal saline and sildenafil citrate solution, respectively. he study indicates that subcutaneous administration of 0.01 to 0.02ml/kg of *Myristica fragrans* increase sexual lrive (libido) in WAD bucks. Animals in Group C, treated with 0.01ml/kg of *Myristica fragrans* extract showed igns of active sexual activity (aggressiveness) and mounting on the second day and progressed throughout the eriod of administration of extract. Thus, the aphrodisiac activity of the extract might be attributed to its nervous timulating property, and also lends support to the claims for its traditional usage as sexual function enhancing erbal medicine. Phytochemical studies indicate the presence of sterols, phenols, alkaloids and amino acids in he extract. Hence, the sexual function improving effect of the extract might be due to the presence of these ompounds. **[Medicinal Plants 2012; 4(1) : 00-00]**

Keywords : *Myristica fragrans*, nutmeg, phytochemicals, West-African Dwarf goats, libido, subcutaneous.

INTRODUCTION

Plants as been a source of many important scientific drugs of the modern world and about 80% of the present day medicines are directly or indirectly originated from plants (Akinyele and Adetunji, 2007). Plants contain primary metabolites (sugar, fats, amino-acids) which supplies food for man and secondary metabolites (glycosides, steroids, alkaloids, terpenes, peptides, phenols, tannins, lignins, etc.) which exert physiological effects on the body (Mendonca-Filho, 2006). Many plants synthesize these substances that are useful to maintenance of health and reproductive performance of man and animal.

Sperm output is influenced by a number of factors which include age, species, season, scrotal size, frequency of ejaculation and degree of sexual preparation. The degree of sexual preparation on the other hand is influenced by the production of testosterone (male sex hormone) by the interstitial cell (Leydig cells) of the testes. Various plants has been said to improve or increase testosterone production in man or rats by various researchers among which is *Myristica fragrans* kernel (nutmeg) (Tajuddin *et al.*, 2005).

Nutmeg is the dried ovoid seed of Myristica fragrans Houtt (Myristiceae) plant. It is a bushy evergreen tree 10-20m high which is indigenous to India, Indonesia and Srilanka (Gil and Cox, 1994), though presently cultivated in many tropical countries of the world (Evans, 2003). The seed (nutmeg) is widely used as spices and in alternative medicine, it has been reported to have aphrodisiac activity (Tajuddin *et al.*, 2005), stomachic, carmmative (Khory and Katrak, 1985), tonic (Chopra *et al.*, 1958), memory enhancing effects and nervous stimulant, aromatic, narcotic, astringent, hypolipidemic, antithrombolic, antifungal, antidysentric, antioxidant and anti-inflamatory

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operties (Nadkarni, 2002; Murcia *et al.*, 2004) by creasing tissue contents of Sodium and Chlorine ions Vessinger *et al.*, 1985). It is reported to be useful in ıralysis and to increase blood circulation (Criddle *et* ., 2003; Tajuddin *et al.*, 2005).

According to Isogai *et al.* (1973) and Janssen and aeckman (1990), nutmeg contain a volatile oil, a fixed il, proteins, fats, starch and mucilage. The fixed oil ontains myristin and myristic acid. Nutmeg yields 5-5% volatile oil which contains pinene, sabinene, amphene, myristicin, elemicin, isoelemicin, eugenol, soeugenol, methoxyeugenol, safrole, imericphenylpropanoids, lignas and neolignas, which ields nutmegbutter. Eugenol the major constituent nhibits lipid peroxidation and maintain activities of nzymes like superoxide dismutase, catalase, glutathione peroxidase, glutamine transferase and glucose-6-phosphate dehydrogenase (Kumaravelu *et al.*, 1996), and has also been reported to have vasodilatory (Criddle *et al.*, 2003) and smooth muscle relaxant property (Damiani *et al.*, 2003).

This present work is aimed at determining the potency of aphrodisiac activity of *Myristica fragrans* (nutmeg) extracts on West African Dwarf bucks.

MATERIALS AND METHOD

Preparation of extract

Nutmeg seeds were bought from the local market in Ilorin, Kwara state, Nigeria. The seeds were air-dried, picked to remove dirt, ground to powder and packaged in cellophane bag for extraction. The extraction of the active substance of the nutmeg seed was carried out with a modified method of Swain (1999) with 96% ethanol at 75-80°C in a soxhlet apparatus for four hours. At the end of the extraction, the liquid extract was filtered using Whatman filter paper. The filtrate was concentrated under reduced pressure in a vacuum dessicator at 30°C for 25minutes using a rotary evaporator (Gallenkamp, UK) to obtain a dark brown mass. The resulting residue (extract) was transferred to a hot air oven where it was dried to a constant weight at 45°C. Subsequently, 5g of the extract was dissolved in 250ml of saline water to obtain appropriate concentrations suitable to achieve a 0.5ml dose by volume of extract which was later administered subcutaneously to the bucks for a period of seven days.

Management of animals

Fifteen West Africa Dwarf bucks of roughly the same age of between 1 to 2 years were purchased within Ilorin metropolis. These bucks were quarantined for 14 days. During this period, the bucks were given oxyletic R, vitamin and ivomec R injection to relief them from stress, external and internal parasites. The bucks were vaccinated against peste des petite ruminantium (PPR) infection before the commencement of the experiment. The bucks were weighed, their heart beat and pulse rate as well as rectal temperature were taken and recorded for the period of the experiment. Blood samples were collected before, during and after the experiment. Animals were housed in individual pen with slatted floor. Wooden troughs and plastic bowls were provided for feeding and watering respectively.

Feed was formulated to meet the basic nutrient requirement of the bucks and they were fed 300g per day throughout the experimental period. *Panicum maximum* and *Gliricidia sepium* were provided *ad-libitum*.

Experimental procedure

The experiment follows a complete randomized design. Animals were randomly assigned into five treatments of three animals per treatment. Animals in treatment A and B received 0.01ml/kg bodyweight normal saline and sildenafil citrate respectively while animals in treatment C, D and E were given 0.1, 0.2 and 0.3ml/kg body weight extract respectively for seven days. The injection was given in the morning subcutaneously.

Statistical analysis

Data on performance indices (Red Blood Cell, White Blood Cell, Packed Cell Volume and Haemoglobin) and biochemical parameters (Total protein, Albumin and Serum testosterone) were analyzed using the analysis of variance (ANOVA) procedure following a completely randomized model with the COSTAT program. The levels of significance were determined using the Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

The physiological effect of *Myristica fragrans* on West African Dwarf bucks are shown in Table 2. All parameters studied were slightly different but not significant. The heartbeat, pulse rate and temperature all followed the same trend and was highest in group C, followed by D. Table 3 shows the result of the effect of *M. fragrans* extract on haematological and biochemical parameters. It was observed that Hb, PCV, RBC and WBC increase with the level of extract and was significantly different ($p > 0.05$). There were no

ble 1. Composition of experimental feed

Ingredients	Percentage inclusion
Maize	30
Groundnut Cake	14
Wheat Offal	33
Salt	1
Premix	0.25
Rice Bran	10
Limestone	1
Bone	0.75
Palm Kernel Cake	10
utrient Contents are:	
Energy (cal)	2257.48
CP	17.30
CF	7.04
Ash	4.7

significant differences in TP between groups C, D and E but differ significantly when compared to groups A and B. TP increase as the level of extract is increased, but reduces at the highest dosage of 0.03ml/kg body weight. The serum albumin levels of groups A, C and D were the same while the highest was observed in group E, the lowest was in group B. There was no significant difference ($p > 0.05$) in serum albumin level in all the groups. It increases as the level of extract is increased. Similarly, there was no significant difference ($p > 0.05$) in all the groups for serum testosterone, though it increases with increasing level of extract. The highest level was observed in group D followed by groups C and E, which had the same value.

The slight increase in heartbeat, pulse rate and temperature supports the work of Lindley (1981) that *M. fragrans* increases blood circulation within the normal range. This corroborates the report of different findings that it contain active chemical substances such as pinene, sabinene, methoxyeugenol, safrole, dimericphenylpropanoids, lignas and neolignas which helps to inhibit lipid peroxidation and improve blood circulation (CSIR, 1962; Isogai *et al.*, 1973; Janssen and Laeckman, 1990). The slight increase in pulse rate support the work of Criddle *et al.* (2003) and Damiani

Table 2. Effect of *Myristica fragrans* (Mf) on some physiological indicies of West African Dwarf Bucks.

Physiological indices	A 0.01 ml/kg BW with normal saline	B 0.01 ml/kg BW with Sildenafil citrate	C 0.01 ml/kg BW with Mf extract	D 0.02 ml/kg BW with Mf extract	E 0.03 ml/kg BW with Mf extract	SEM
First Day of experiment						
HEART-BEAT	118/69	104/71	123/92	92/65	97/71	± 762.80/838.93
PULSE RATE	68.00	68.00	74.00	72.00	71.00	± 33.00
RECTAL TEMP., °C	38.23	38.53	38.50	38.60	38.40	± 0.08
3rd day of experiment						
HEART-BEAT	126/51	135/89	113/81	105/70	93/71	± 887.27/1162.47
PULSE RATE	72.70^{ab}	81.30^{a}	68.70^{b}	67.70^{b}	77.30^{ab}	±41.93
RECTAL TEMP., °C	37.80^{6}	38.40^{ab}	38.50^{ab}	38.80^{a}	38.60^{a}	±0.14
Seventh day of experiment						
HEART-BEAT	$118^{a}/69^{b}$	$102^{a}/68^{b}$	$144^{a}/110^{a}$	$141^{a}/196^{ab}$	$116^{a}/93^{ab}$	±644.00/409.53
PULSE RATE	68.00	78.30	75.70	70.00	72.70	± 29.27
RECTAL TEMP., °C	38.20	38.40	38.70	38.70	38.50	±0.08

Mf - *Myristica fragrans*; SEM- Standard error of the mean,
a, b, c- means in the same row with different superscripts differ significantly ($P < 0.05$).

ble 3. Effect of *Myristica fragrans* (Mf) on haematological and biochemical parameters of West African dwarf bucks.

ematological/ chemical lices	A 0.01 ml/kg BW with normal saline	B 0.01 ml/kg BW with sildenafil citrate	C 0.01 ml/kg BW with Mf extract	D 0.02 ml/kg BW with Mf extract	E 0.03 ml/kg BW with Mf extract	SEM
day of extract application						
Hb, g/dl	6.10^{d}	6.10^{d}	7.10^{c}	9.20^{b}	10.50^{a}	±0.076
PCV, %	18.00^{d}	18.00^{d}	20.70^{c}	27.00^{b}	31.00^{a}	±0.145
RBC × 10^{6}/mm^{3}	2.10^{c}	2.20^{bc}	2.80^{a}	2.60^{ab}	2.63^{a}	±0.051
WBC × 10^{3}/mm^{3}	6.80^{d}	16.20^{a}	6.80^{d}	12.40^{c}	13.20^{b}	±0.059
Total protein, g/dl	53.00^{b}	65.00^{a}	67.00^{a}	66.00^{a}	68.00^{a}	±7.202
Albumin, g/dl	36.00	35.00	36.00	36.00	37.00	±3.803
day of extract application						
Hb, g/dl	6.10^{c}	8.10^{c}	7.50^{d}	9.50^{b}	10.20^{a}	±0.056
PCV, %	18.00^{c}	24.00^{b}	22.30^{b}	28.00^{a}	30.30^{a}	±3.938
RBC × 10^{6}/mm^{3}	2.10^{c}	3.10^{b}	3.20^{ab}	3.40^{ab}	3.60^{a}	±0.055
WBC × 10^{3}/mm^{3}	6.80^{c}	8.20^{b}	4.10^{c}	5.40^{d}	8.90^{a}	±0.068
Total protein, g/dl	53.00^{c}	62.00^{b}	70.00^{a}	72.00^{a}	68.00^{a}	±4.733
Albumin, g/dl	36.00	35.00	36.00	36.00	37.00	±6.533
Testosterone	–	–	–	–	–	–

Mf- *Myristica fragrans*; SEM- Standard error of the mean,
a, b, c- means in the same row with different superscripts differ significantly ($P< 0.05$).

et al. (2003) that *M. fragrans* extract have vasodilatory and smooth muscle relaxant property. *M. fragrans* extract had little or no effect on temperature, because it had no negative effect on the animal. This could be due to the fact that the dosage was within tolerable range.

The observed increase in Hb, PCV and RBC could be attributed to the improvement in production of red blood cell by the phytochemicals (sterols, phenols, alkaloids and amino acids) present in *M. fragrans* extract when used within a safe range. This support the work of Tajuddin *et al.* (2005) that *M. fragrans* extract could be used as a tonic to improve blood production and circulation. Eugenol the major phytochemical in *M. fragrans* butter helps to inhibit lipid peroxidation and maintains the activities of enzymes like superoxide dismutase, catalase, glutathione peroxidise, glutamine transferase and glucose-6-phosphate dehydrogenase (Kumaravelu *et al.*, 1996). This helps to increase the binding of oxygen to the haeme of haemoglobin thereby leading to improved erythropoiesis. The resultant effect is the activation of cytochrome oxidase and improvement of oxidative phosphorylation in red blood cells thereby leading to effective oxygen utilization.

The white blood cell count (WBC) were significantly different in all the groups with the highest in group E (0.3 ml extract) and the lowest in group C (0.1ml extract). WBC increased as the level of *M. fragrans* administered increased. A great number of leucocytes, therefore, might have been produced and mobilized for defensive actions. This support the work of Schalm *et al.* (2010) that leucocytes exercise their function as free macrophages in the tissue in defense against microbial agents. Monocytes for instance have a great ability for phagocytosis or pinocytosis. The total serum protein increased as the level of extract is increased but reduces at the highest dosage of 0.3ml/10kg weight. *M. fragrans* improve total serum protein as a result of the presence of amino-acids, sterols, phenols, alkaloids (Parle *et al.*, 2004) and helps to increase tissue contents of Na and Cl ions (Wessinger, 1985; Olajide *et al.*, 1999). Though, there was no

nificant differences (p>0.05) in serum albumin level ...ll the groups. Serum albumin levels seems to increase h increasing level of *M. fragrans* extract, suggesting t the animals had good clotting ability of the blood l adequate ability to prevent haemorrhage (Robert *al.*, 2000).

Similarly, the observed increase in serum tosterone with increasing level of extract, supports : work of Tajuddin *et al.* (2005) that oral ninistration of *M. fragrans* extract at 500mg/kg to s, significantly increased the mounting frequency, romission frequency, ejaculatory latency in first and :ond series and caused significant reduction in the)unting latency, intromission latency and post iculatory interval. Subcutaneous administration of *fragrans* extract increase libido at dose range of)1 to 0.02ml/kg body weight with physical sexual splay such as sniffing of female urogenital organ, cking, butting, mounting and intromission.

CONCLUSION

ne study showed that subcutaneous administration of 01-0.02ml *Myristica fragrans* extract/kg as per body eight increase sexual drive (libido) in West African warf goats. This confirms previous studies that *M. agrans* extract as aphrodisiac property. Thus, the phrodisiac activity of the extract might be attributed) its nervous stimulating property, and lends support) claims for its traditional usage as sexual function nhancing herbal medicine. Further research should be one with regards to detailed sexual function improving ctivities, especially at higher doses of extracts or active onstituents of *M. fragrans*. In addition, further studies re also necessary for the identification of the active :onstituents responsible for sexual function improving ictivities and the mechanism by which it affects sexual function.

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