



PHYSICOCHEMICAL AND HPTLC ANALYSIS OF THE DRUGS USED FOR THE PREPARATION OF NILAPPANAI CHOORANAM– A SIDDHA FORMULATION

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ABSTRACT

Plants are the major source of naturally occurring medicines. The efficacy and popularity of any system of medicine depends on the quality of medicines used for the treatment. *Nilappanai chooranam* is an important Siddha medicine which is used for Oligospermia and Leucorrhoea. Oligospermia and Leucorrhoea are very common health problems in India. *Nilappanai chooranam* has seven ingredients which are *Curculigo orchiodes* Gaertn. (Rhizome), *Mucuna pruriens* Bak. (Seed), *Tribulus terrestris* Linn. (Fruit), *Emblia officinalis* Gaertn. (Dried Fruit), *Bombax malabaricum* DC. (Exudate), *Tinospora cordifolia* (Willd.) Miers (Stem Extract) and *Borasses flabellifer* Linn. (Secondary product of Fruit). Present study comprises of the determination of physicochemical, preliminary phytochemical and HPTLC analysis of these plant materials. The physicochemical parameters like loss on drying at 105°C, ash content, acid insoluble ash, water soluble ash, solubility in water and alcohol, volatile oil, etc. were determined by standard methods. The preliminary phytochemical tests were carried out using different extractives of the plant material. HPTLC fingerprints were taken. These results obtained for each drug material can be conveniently used as tools for standardization. Apart from these studies, this paper attempts to encompass the available literature on these 7 drug materials with respect to its vernacular names, phytochemical aspects and traditional uses.

KEY WORDS: Nilappanai chooranam, physico-chemical parameters, HPTLC profiles, phytochemical tests.

INTRODUCTION

Siddha system of medicine is one of the oldest traditional system of medicine which is effective for treating various diseases including even chronic conditions. *Nilappanai chooranam* is an important Siddha formulation used to treat *Vidhanu kuraivu* (oligospermia) and *Vellai noi* (leucorrhoea).^[1] *Nilappanai chooranam* is prepared with seven ingredients. The present paper deals with the determination of physico-chemical parameters,

preliminary phytochemical characters and HPTLC fingerprints following WHO and FDA guidelines with a view to identify and standardise these medicinal plant materials which in turn help in the quality control. The ingredients used for the preparation of *Nilappanai chooranam*^[2] are given in Table 1.

Table 1: Ingredients of Nilappanai chooranam.

Sl. No.	Name of raw drug In Tamil	Botanical name	Part
1.	Nilappanai kizhangu	<i>Curculigo orchiodes</i> Gaertn.	Rhizome
2.	Poonaikali vithai	<i>Mucuna pruriens</i> Bak.	Seed
3.	Nerinjil mul	<i>Tribulus terrestris</i> Linn.	Fruit
4.	Nelli vatral	<i>Emblia officinalis</i> Gaertn.	Fruit (Dried)
5.	Mulillavam pisin	<i>Bombax malabaricum</i> DC.	Exudate
6.	Seenthil sarkarai	<i>Tinospora cordifolia</i> (Willd.) Miers	Stem (Extract)
7.	Panang karkandu	<i>Borasses flabellifer</i> Linn.	Fruit (Secondary product)

Brief description on the plant materials:**1. Nilappanai kizhangu - *Curculigo orchiodes* Gaertn. (Rhizome)**

Curculigo orchiodes Gaertn. belonging to the family *Amaryllidaceae* is a small herb, upto 30 cm high with tuberous root stock, occurring wild in sub-tropical Himalayas from Kumaon eastwards, ascending upto 1830 m in Khasi hills, Manipur and the Eastern Ghats, also from Konkan southwards. The drug is collected from two year old plants, washed well and cleared of rootlets, sliced and dried in shade.^[3] The vernacular names of the plant are Sanskrit: Bhumitila; Assamese: Talmuli, Tailmuli; Bengali: Talmalu, Tallur; English: golden eye-grass; Gujrati: Kalirnusali; Hindi: Syahmusali, Kalimusli; Kannada: Neltal, Neltathigodde, Nelatale, Nelatelegadde; Malayalam: Nilappene; Marathi: Kali musali, Bhuimaddi; Oriya: Talamuli; Punjabi: Syah musali, Musali safed; Tamil: Nilappanai; Telugu: Nel tadigadda; and Urdu: Musali Siyah, Kali Musali.^[3]



Figure I: *Curculigo orchiodes* Gaertn., Rhizome.

Drug occurs in transversely cut pieces of 2.5 to 5 cm long, cylindrical, straight to slightly curved, cut surface 1.0 to 4.5 cm in diameter; external surface blackish-brown, cut surface cream coloured; surface with numerous shallow wrinkles and transverse cracks; with a few rootlets and root scars; nodes and internodes prominent; taste, mucilaginous and slightly bitter. Saponins (curculigosaponin C, F and G); sapogenins; phenolic glycosides, a triterpene alcohol; a pentacyclic triterpene, an aliphatic compound, hentriacontanol, sitosterol, stigmasterol, cycloartenol, sucrose, a peptide, Curculin C and amino acids are reported to be present in the plant material.^[4] The drug has tonic, aphrodisiac, demulcent, diuretic properties and used in asthma, impotency, jaundice, skin, urinary and venereal diseases.^[5]

2. Poonaikali vithai – *Mucuna pruriens* Bak. (Seed)

Poonaikali vithai consists of dried seed of *Mucuna pruriens* (L.) DC. Syn. *M. prurita* Hook. is a twinning annual that can reach 15 m in length. (Fam. *Papilionaceae*; *Fabaceae*), is a herbaceous twining

annual plant found wild almost all over the country and in Andaman and Nicobar Islands.^[6]



Figure II: *Mucuna pruriens* Bak., Seed.

Vernacular names of *Mucuna pruriens* are Sanskrit: Kapikacchu, Markai, Kandura, Kapiprabha; Bengali: Aalkushee, Alkusa; English: Cowhage, Cowitch; Gujrati: Kaucha, Kavach; Hindi: Kevanch, Kaunch, Khujanee; Kannada: Nasukunnee, Nasuganni, Nayisonanguballi; Malayalam: Shoriyanam, Naykkorana, Naykkuran; Marathi: Khajkuhilee; Oriya: Baikhujnee; Punjabi: Aalkushee, Kavanch; Tamil: Punaik-Kalee, Punaikkalee, Punaippidukkam; Telugu: Piliyadugu, Pillee adugu; Urdu: Kaunch.^[6] The plant is almost completely covered with fuzzy hairs when young, but it is almost free of hairs when it grows older.^[7] Fruits, longitudinal pods are curved, 4 to 6 seeded and about 10 cm long^[8] and are densely covered with persistent pale-brown or grey trichomes that cause irritating blisters if they come in contact with skin. The chemical compounds responsible for the itch is a protein, mucunain and serotonin.^[8] The seeds contain the alkaloids, mucunine, mucunadine, mucunadinine, prurieninine, pruriendine and nicotine, besides beta-sitosterol, glutathione, lecithin, vernolic and gallic acids. And also Choline, tryptamine, alkylamines, steroids, flavonoids, coumarins and cardenolides. Seed is astringent, nervine tonic, local stimulant, used in impotence, spermatorrhoea, urinary troubles, leucorrhoea, traditionally used for male virility. Also used in depressive neurosis.^[9]

3. Nerinjil - *Tribulus terrestris* Linn. (Fruit)

Nerinjil consists of dried, ripe, entire fruit of *Tribulus terrestris* Linn. (Fam: *Zygophyllaceae*), an annual, rarely perennial common weed of the pasture lands, road sides and other waste places, chiefly in hot, dry and sandy regions, grows throughout India as prostrate herb and upto 3,000 m in Kashmir.^[10]



Figure III: *Tribulus terrestris* Linn., Fruit.

Its vernacular names are Sanskrit: Gokshuraka, Traikanthaka, Trikatna; Assamese: Gokhurkata, Gokshura; Bengali: Gokhri, Gokshura; English: Caltrop fruit; Gujarati: Bethagokharu, Mithagokhru, Nanagokharu; Hindi: Gokhru; Kannada: Neggilamullu, Neggilu, Sannaneggilu; Kashmiri: Pakhda, Michikand; Malayalam: Nerinjil; Marathi: Gokharu, Sarate; Oriya: Gokhyura, Gukhura; Punjabi: Bhakhra, Gokhru; Tamil: Nerinjil, Nerunjil; Telugu: Palleru Kaya; Urdu: Khar-e-Khasak Khurd. Fruit stalked, light or greenish yellow, five ribbed or angled, more or less spherical in structure and covered with short stiff or pubescent hairs, 1 cm in diameter with five pairs, of prominent short stiff spines, pointed downwards, about 0.5 cm in length, tips of spines almost meet in pairs whole together forming pentagonal framework around fruit, ripe fruit separates into five segment, of each cocci and each appears as single-fruit, each coccus semi-lunar or plano-convex in structure one chambered, armed with a pair of spines, starting from its middle, containing four or more seeds, taste, slightly astringent.^[10] The plant contains saponins, which on hydrolysis yield sapogenins—diosgenin, gitogenin, chlorogenin, ruscogenin, 25D-spirosta-3, 5-diene, among others. Flavonoids—rutin, quercetin, kaempferol, kaempferol-3-glucoside and-rutinoside, and tribuloside have been isolated from the leaves and fruits. The seeds contain carboline alkaloids— harmine and harmine. Harmol is also reported from the herb. Fruits are diuretic, demulcent, anti-inflammatory, anabolic, spasmolytic, muscle relaxant, hypotensive, hypoglycaemic. Used in strangury, calculus affections, urolithiasis, crystalluria, urinary discharges, pruritus-ani, as a tonic in sexual inadequacy; also as a supporting medicine in cough and asthma. Leaf is diuretic, haemostatic. Root is stomachic, diuretic.^[11]

4. Nelli vatal - *Embolica officinalis* Gaertn. (Dried Fruit)

Amalaki consists of pericarp of dried mature fruits of *Embolica officinalis* Gaertn. Syn. *Phyllanthus emblica* Linn. (Fam. *Euphorbiaceae*); mostly collected in winter season after ripening and in Kashmir in summer, a small or medium sized tree, found both in natural state in mixed deciduous forests of the country ascending to

1300 m on hills; cultivated in gardens, homeyards or grown as a road side tree.^[12] Vernacular names of *Embolica officinalis* are Sanskrit: Amrtaphala, Amalaka, Dhatriphala; Assamese: Amlakhi, Amlakhu, Amlaku; Bengali: Amla, Dhatri; English: Emblic Myrobalan; Gujarati: Ambala, Amala; Hindi: Amla, Aonla; Kannada: Nellikayi, Bela nelli, pottadenollikayi; Kashmiri: Amla, Embali; Malayalam: Nellikka; Marathi: Anvala, Avalkathi; Oriya: Ainla, Anala; Punjabi: Aula, amla; Tamil: Nellikai, nelli; Telugu: Usirika; Urdu: Amla, Amlaj. Drug consists of curled pieces of pericarp of dried fruit occurring either as separated single segment; 1-2 cm long or united as 3 or 4 segments; bulk colour grey to black, pieces showing, a broad, highly shrivelled and wrinkled external convex surface to somewhat concave, transversely wrinkled lateral surface, external surface shows a few whitish specks, occasionally some pieces show a portion of stony testa (which should be removed before processing); texture rough, cartilaginous, tough; taste, sour and astringent.^[12]



Figure IV: *Embolice officinalis* Gaertn., Dried Fruit.

Amla (*Embolice officinalis* Gaertn.) is a small to medium sized deciduous tree and 8-18 meters height. Fruits are globose, fleshy, pale yellow with six obscure vertical furrows enclosing six trigonous seeds in 2- seeded 3 crustaceous cocci found throughout India.^[13] The phytochemicals such as Vitamin C, minerals and amino acids - Proline, Glutamic acid, aspartic acid, alanine, and lysine. tannins, alkaloids and phenols. tannins - Emblicanin A and B, gallic acid, ellagic acid and glucose wherein the other gives ellagic acid, glucose, Phyllembin. gallic acid, corilagin, furosin and geraniin, quercetin, phyllantine, phyllantidine, amino acids, carbohydrates, gallic acid, ellagic acid, 1-Ogalloyl- beta-D-glucose, 3,6-di-O-galloyl-D-glucose, chebulinic acid, quercetin, chebulagic acid, corilagin, 1,6-di-O- galloyl beta-D-glucose, 3-Ethylgallic acid (3-ethoxy 4,5-dihydroxybenzoic acid) and isostrictinin. kaempferol-3-O-alpha L-(6"-methyl) rhamnopyranoside, kaempferol-3-O-alpha L (6"-ethyl) rhamnopyranoside, linoleic acid, linolenic acid, stearic acid, oleic acid, palmitic acid, and myristic acid are reported in the plant material.^[13] Fruit is antianaemic, anabolic, antiemetic, bechic, astringent, antihemorrhagic, antidiarrhoeal, diuretic, antidiabetic,

carminative, antioxidant. Used in jaundice, dyspepsia, bacillary dysentery, eye trouble and as a gastrointestinal tonic. Juice with turmeric powder and honey is prescribed in diabetes insipidus. Seed—antibilious, antiasthmatic. Used in bronchitis. A decoction of powdered pericarp is prescribed for peptic ulcer.^[14]

5. Mulillavam pisin - *Bombax malabaricum* DC. (Exudate)

Bombax malabaricum DC. Syn. *B. ceiba* Linn., *Salmalia malabarica* Schott. & Endl. (Fam. *Bombacaceae*), a deciduous tree attaining a height upto 40 m and a girth upto 6 m or more and distributed throughout the hotter parts of the country upto 1500 m or more.^[15] *Bombax malabaricum* D.C. is commonly known as Silk-cotton tree or Indian kapok tree belonging to the family *Bombacaceae*.^[15] It is commonly found in India, Burma and Sri Lanka. Plant grows throughout hotter parts of India; up to elevation of about 1500 meters. In Peninsular India, the tree is very common in dry as well as moist deciduous forests and near rivers, also cultivated in gardens.



Figure V: *Bombax malabaricum* DC., Exudate.

The vernacular names of *Bombax malabaricum* are Sansk.: Moca, Picchila, Raktapushpa; Assam.: Semul; Beng.: Shimul, Simul; Eng.: Silk-Cotton Tree; Guj.: Shemalo; Hindi.: Semal, Semar; Kan.: Kempuburunga; Mal.: Mullilavu; Mar.: Sanvar, Katesavar; Punj.: Simble; Tam.: Elavam; Tel.: Buruga; Urdu.: Sembhal. Bark is 0.5-1 cm thick, pale-ashy to silvery-grey externally, brownish internally, external surface rough with vertical and transverse cracks, mucilaginous on chewing; fracture, fibrous.^[15] Phytochemical Constituents reported are β -sitosterol, its glucosides, lupeol, hentriacontane, hentriacontanol; gave 7-hydroxycadalene, arachidic, linoleic, myristic, oleic and palmitic acids, carotenes, *n*-hexacosanol, ethylgallate, tocopherols, gallic and tannic acids, L-arbinose, D-galactose, D-galacturonic acid and D-galactopyranose [16]. The drug is astringent, demulcent, styptic and used for diarrhoea, dysentery, haemoptysis, bleeding piles, menorrhagia, spermatorrhoea.^[17]

6. Seenthil sarkarai - *Tinospora cordifolia* (Willd.) Miers. (Stem Extract)

Tinospora cordifolia (Willd.) Miers. is a large, glabrous, deciduous climbing shrub found throughout tropical India, belonging to the family Menispermaceae, ascending to an altitude of 300 m. Stems are succulent with long filiform fleshy aerial roots from the branches.^[18,19,20]



Figure VI: *Tinospora cordifolia* (Willd.) Miers., Stem Extract.

The vernacular names of the plant are:- Sanskrit: Amrtavall1, Amrta, Madhuparni, Guduchi; Assamese: Siddhilata, Amarlata; Bengali: Gulancha; Gujrati: Galac, Garo; Hindi: Giloe, Gurcha; Kannada: Amrutaballi; Kashmiri: Amrita, Gilo; Malayalam: Chittamrutu; Marathi: Gulvel; Oriya: Guluchi; Punjabi: Gilo; Tamil: Seendal, Seendil kodi; Telugu: Thippateega; Urdu: Gilo. Drug occurs in pieces of varying thickness ranging from 0.6-5 cm in diameter, young stems green with smooth surfaces and swelling at nodes, older ones show a light brown surface marked with warty protuberances due to circular lenticels, transversely smoothened surface shows a radial structure with conspicuous medullary rays traversing porous tissues, taste bitter.^[21] Different constituents reported to be present in the stem are alkaloids including berberine, a bitter glucoside giolin, giloinin, gilosterol, columbin, chasamanthin, palmarin, tinisporon, tinosporic acid and tinosporol.^[22] *Tinospora cordifolia* is mentioned as a constituent of several compound preparations, used in general debility, dyspepsia, fevers and urinary diseases. The plant also possesses antiviral as well as antibacterial properties. Dry twigs with bark intact, constitute the drug. Stem is a constituent of several medicines used in general debility, dyspepsia, fevers and urinary diseases. Bitter principles present in the drug show antispasmodic, antipyretic, and anti-inflammatory properties. Root is a powerful emetic and used for visceral obstruction. Its watery extract is used in leprosy.^[23]

7. Panang karkandu, *Borasses flabellifer* Linn., Fruit (Secondary product)

Panang karkandu is a kind of rock sugar made from panam pathaneer (a sweet drink) which is extrated from the flower of palmera tree (panai maram) Family: Arecaceae. Pana karkandu is good for health and it is

used to reduce heat of the body & it has good medicinal value karkandu is crystallized sugar, apparently known as rock candy in English. It's generally made by dissolving sugar in warm water until it doesn't dissolve any more, then seeding it with a few crystals and letting it cool. Over the next several hours/days, the stuff will crystallize out of the solution. Panam karkandu is the same process, except that it is done directly on the sap of a certain type of palm tree, which has a lot of sugar in it. The crystals are much smaller than you might get with cane/beet sugar. Think of it like crystallized natural unrefined sugar. Real panam karkandu is not made from cane sugar--it's palmyra sugar, from the palmyra palm, also called the toddy palm. It's a speciality of districts in southern Tamilnadu like Tirunelveli and I think northern Sri Lanka as well. The candy is brown and tastes quite different from plain old crystallized sugar candy.^[24] *Borassus flabellifer* L, belongs to family Arecaceae, is a native of tropical Africa but cultivated and naturalized throughout India.^[25] It is a robust tree and can live more than 100 y and reach a height of 30 metres (98 ft), with a canopy of green-bluish leaves with several dozen fronds spreading 3 m (9.8 ft) across.^[26]



Figure VII: *Borasses flabellifer* Linn., Secondary product of Fruit.

The different vernacular names are Hindi: Taad; English: Toddy palm, Palmyra palm; Tamil: Talam ;Telugu: Tatichettu; Malayalam: Karimpana; Bengali: Taala; Kannada: Olegari; Sanskrit: Taalah.^[24] *Borassus flabellifer* contains albuminoids, fats and vitamins A and C.^[27] vitamin B-complex.^[28] borassosides and dioscin.^[29] steroidal glycosides and carbohydrates, flabelliferrins.^[30] 28 chemical constituents have been identified from ethanol root extract of *Borassus flabellifer* by Gas Chromatogram-Mass spectrometry (GC-MS) analysis namely 2-Furanmethanol, Propane, 1-(1-methylethoxy), 2-Cyclopenten-1-one, 2-hydroxy-, 2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one, Glycerin, 1,3-Propanediamine, 1,2-Propanediol 2-acetate, Butane, 1-(ethenyl-3-methyl-, Propane, 1,1-diethoxy-, 1H-Imidazole-4-carboxamide, 5-amino-, 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, Resorcinol, Phenol, 2,6-dimethoxy-, 6H-Purin-6-one, 2-amino-1,7-dihydro-, 6H-Purin-6-one, 2-amino-1,7-dihydro-, 1,4-Benzenediol, 2-methoxy-, Phenol, 3,4-dimethoxy-, Benzene, 1-(1,5-dimethyl-4-hexenyl)-4-methyl-, Phenol, 4-[2-(dimethylamino)ethyl]-, 1-Butanol, 2-amino-, 3-

Hydroxy-4-methoxybenzoic acid, Phenol, 3,4,5-trimethoxy-, Phenol, 5-(1,5-dimethyl-4-hexenyl)-2-methyl-, (R)-, 7H-Furo[3,2-g] benzopyran-7-one, n-Hexadecanoic acid, Pentanoic acid, 10-undecenyl ester, Octadecanoic acid.^[31] The different parts of the plant are being used for medicinal properties like antihelminthic and diuretic.^[32,33] Fresh sap—diuretic, cooling, antiphlegmatic, laxative, antiinflammatory. Slightly fermented juice is given in diabetes. Palmjaggery— used as an energy food for convalescents. Ash of dry spadix— antacid, antibilious (used in heartburn). Young root, terminal buds, leaf-stalks—used in gastritis and hiccups. The sap is given as a tonic to asthmatic and anaemic patients. Jaggery is given for anaemia, for diseases characterized by a marked loss of potassium. Palm candy is used in coughs and pulmonary affections and as a laxative for children.^[34]

MATERIALS AND METHODS

Reagents and Chemicals

All the reagents, chemicals and solvents used were of GPR grade.

Collection of the plant materials

Seenthil sarkarai was procured from the Indian Medical Practitioner's Co-operative Pharmacy (IMPCOPS), Madras. The other raw drugs were procured from Thiruvananthapuram, identified and authenticated by a botanist, University of Kerala, Thiruvananthapuram.

Determination of physico-chemical parameters

The physico-chemical analysis such as determination of loss on drying at 105°C, total ash content, acid insoluble ash, extractable matter in water and alcohol and pH of water extract were carried out by standard methods.^[35,36]

Preliminary phytochemical analysis

For preliminary phytochemical studies, 5g of drug was successively extracted using Soxhlet apparatus with petroleum ether, chloroform, ethanol and water. The extracts were concentrated by distilling off the solvents under reduced pressure. The presences of different phytoconstituents were determined by standard procedure.^[37,38] The qualitative chemical tests were carried out for identification of the nature of different phytoconstituents present in the formulation.

High performance thin layer chromatographic analysis

Sample preparation

1 gm powdered drug was extracted with 10 ml of ethyl alcohol, kept the solution overnight and boiled for 10 minutes. The extract was filtered and concentrated to 1 ml.^[39]

Sample application

The alcohol extract of the chooranam was applied as two tracks on silica gel 60 F254 pre-coated aluminium sheets in the form of bands of length 10 mm, volume 5 µl and 10 µl and with distance 10 mm between two bands

through CAMAG microlitre syringe using Automatic TLC Sampler 4 (ATS4).

Mobile phase and development of chromatogram

The plate was developed using appropriate mobile phase, which was found to give a good separation and resolution of components of extract. Linear ascending development was carried out in 10 cm x 10 cm twin trough glass chamber saturated with mobile phase. The mobile phase was allowed to migrate a distance of 70 mm. After the development, the TLC plate was dried completely.

Documentation

The plate was kept in CAMAG visualizer and the images were captured under UV light at 254 nm and 366 nm. The possibility of visual evaluation of separated samples on the plate is one of the most valuable aspects of TLC. It reaches a completely new dimension in HPTLC through the use of state-of-the-art techniques for generating and evaluating digital images.

Densitometric Analysis

Densitometric scanning was performed using CAMAG TLC Scanner 4 which is operated by winCATS software. The sources of radiation utilized were deuterium lamp

and mercury lamp. The bands were analyzed at a wavelength of 254 nm and 366 nm. The slit dimensions used in the analysis were 8.00 x 0.40 mm, Macro. The R_f values and finger print profile were recorded. Concentrations of compound chromatographed were evaluated as peak areas.

Derivatisation

By derivatization, substances that do not respond to visible or UV light can be rendered detectable. The plate was derivatised using vanillin-sulphuric acid reagent, heated at 105°C by placing on CAMAG TLC plate heater till the colour of the bands appeared. Then the plate was visualized under white light and the chromatograms were documented. After that the plate was densitometrically scanned for finger print profile study at 575 nm using tungsten light source. The fingerprinting profiles were recorded.

RESULTS AND DISCUSSION

The physicochemical parameters of the 7 drug materials are given in Table 2. These parameters vary with each other. These physical constants are important parameters for identification and detection of adulterants or substituents.

Table 2: Physicochemical parameters.

Sl. No.	Parameters	RESULTS						
		1 C.o.	2 M.p.	3 T.t.	4 E.o.	5 B.m.	6 T.c.	7 B.f.
1.	Foreign matter %	Nil	Nil	Nil	Nil	Nil	Nil	Nil
2.	Loss on Drying at 105°C %	13.27	13.86	10.66	12.57	17.87	11.52	0.89
3.	Total Ash Content %	7.31	2.76	6.67	4.41	6.29	2.92	0.21
4.	Acid Insoluble Ash %	2.89	0.18	0.16	2.11	1.86	0.80	Nil
5.	Water soluble Extractive %	19.45	21.38	7.19	36.93	10.81	3.95	94.19
6.	Alcohol soluble Extractive %	4.56	6.93	6.29	20.52	25.88	2.48	25.88
7.	Volatile oil %	Traces	Nil	Nil	Nil	Nil	0.25	Nil

C.o. - *Curculigo orchoides*; M.p. - *Mucuna pruriens*; T.t. - *Tribulus terrestris*; E.o. - *Embolia officinalis*; B.m. - *Bombax malabaricum*; T.c. - *Tinospora cordifolia*; B.f. - *Borassas flabellifer*

The preliminary phytochemical tests of the powdered plant materials were conducted and the results are shown in Table 3.

Table 3: Preliminary phytochemical tests.

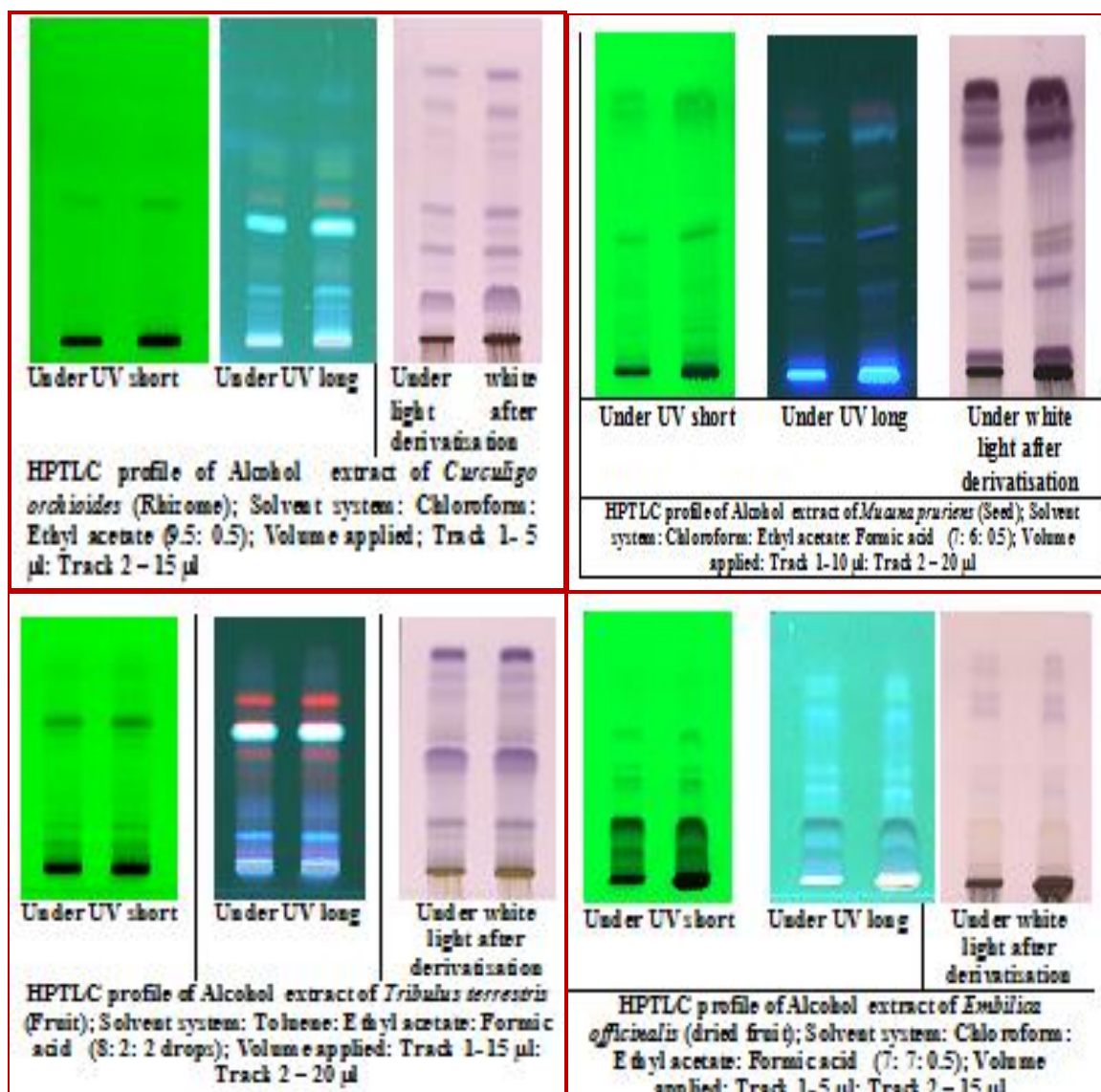
Sl. No.	Parameters	RESULTS						
		1 C.o.	2 M.p.	3 T.t.	4 E.o.	5 B.m.	6 T.c.	7 B.f.
1.	Terpenoids	+ve	+ve		+ve	+ve	+ve	+ve
2.	Phenols	+ve	+ve	+ve	+ve	+ve	+ve	+ve
3.	Flavonoids		+ve	+ve			+ve	+ve
4.	Steroids	+ve	+ve			+ve	+ve	+ve
5.	Glycosides	+ve	+ve		+ve	+ve	+ve	+ve
6.	Acids						+ve	+ve
7.	Alkaloids	+ve	+ve	+ve			+ve	+ve
8.	Tannins					+ve	+ve	+ve
9.	Lignans							+ve
10.	Saponins	+ve		+ve			+ve	+ve
11.	Aminoacids	+ve		+ve		+ve	+ve	+ve

C.o. - *Curculigo orchoides*; *M.p.* - *Mucuna pruriens*; *T.t.* - *Tribulus terrestris*; *E.o.* - *Embilica officinalis*; *B.m.* - *Bombax malabaricum*; *T.c.* - *Tinospora cordifolia*; *B.f.* - *Borasses flabellifer*

The results show the presence of almost all major secondary metabolites which revealed their potent therapeutic efficacies.

HPTLC photodocumentation profiles of the alcohol extracts of the drugs in short UV light (254 nm), long UV light (366 nm) and white light (575 nm) after derivatisation using vanillin- sulphuric acid reagent are given in Figure 8. The solvent systems were fixed by trial and error method. For each drug, the solvent system which gave maximum resolution was selected. The

results of HPTLC study shows that all the plant materials are big source of phytochemicals which are responsible for their medicinal effects. HPTLC study of each plant gave characteristic patterns which can be used to establish the identity of the drug. Rf value is characteristic for a given stationary phase and solvent combination. HPTLC fingerprints along with other parameters such as physicochemical parameters will be helpful in the identification and quality assessment of herbal drugs.



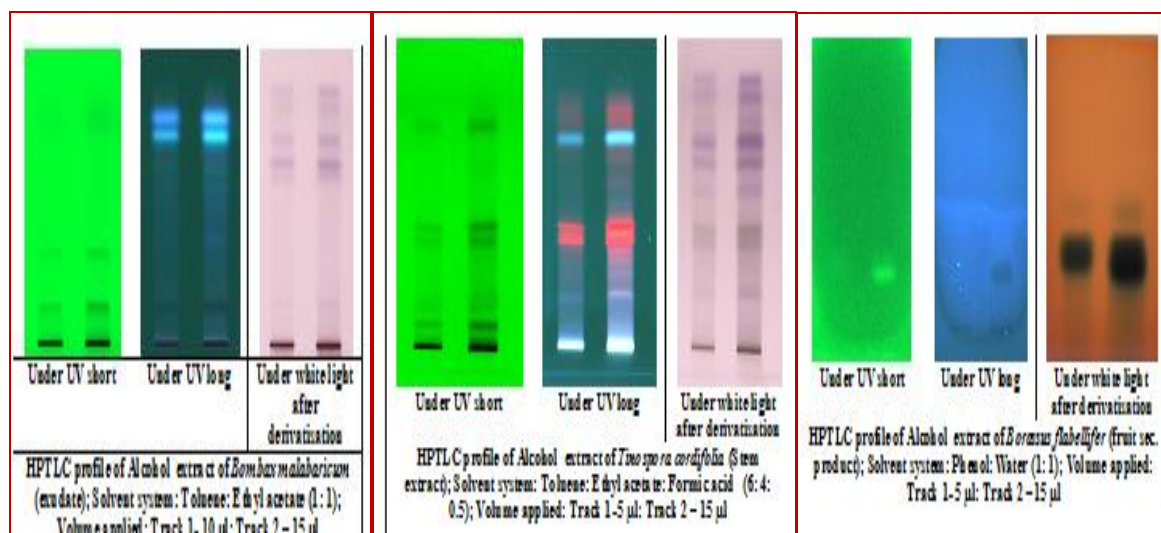


Fig 8: HPTLC Chromatogram of the 7 plant materials.

R_f values and area of bands obtained for the drug materials at different wavelengths are given in Table 4.

Table 4: R_f values and area of bands obtained at different wavelengths.

Sample	Wavelength, 254 nm		Wavelength, 366 nm		Wavelength, 575 nm	
	R_f values	Area of spots %	R_f values	Area of spots %	R_f values	Area of spots %
<i>Curculigo orchioides</i> (Rhizome)	0.01	73.15	0.02	1.57	0.02	0.47
	0.52	8.14	0.20	13.89	0.15	30.93
	0.74	10.58	0.44	6.25	0.19	0.50
	0.80	3.20		78.29	0.25	2.38
	0.94	4.94			0.32	14.50
					0.40	4.12
					0.47	13.09
					0.69	4.03
					0.75	4.39
					0.85	6.16
					0.97	9.20
<i>Mucuna pruriens</i> (Seed)	0.05	1.30	0.04	2.23	0.01	7.98
	0.13	1.72	0.28	2.67	0.05	11.05
	0.17	2.67	0.41	5.34	0.14	0.16
	0.28	3.04	0.47	4.93	0.29	11.47
	0.45	9.97	0.57	10.14	0.40	4.17
	0.61	2.13	0.74	2.57	0.41	3.85
	0.75	2.47	0.81	16.89	0.46	4.48
	0.88	24.53	0.88	6.05	0.63	0.80
	0.93	23.88	0.99	0.99	0.73	8.06
					0.80	24.41
					0.89	7.46
<i>Tribulus terrestris</i> (Fruit)	0.05	0.64	0.01	7.70	0.16	2.44
	0.10	4.76	0.04	7.26	0.22	9.70
	0.19	5.91	0.17	3.11	0.54	46.94
	0.24	1.08	0.29	1.76	0.61	10.08
	0.33	4.67	0.64	79.82	0.80	3.93
	0.38	1.05	0.97	0.36	0.89	4.01
	0.56	3.01			0.98	3.23
	0.61	10.10				
	0.66	31.19				
	0.79	5.15				
	0.89	11.12				

<i>Emblica officinalis</i> (Dried Fruit)	0.12	13.59	0.03	0.45	0.06	3.54
	0.25	52.74	0.07	1.43	0.25	10.60
	0.41	4.77	0.16	7.77	0.32	1.77
	0.44	6.11	0.33	20.06	0.40	6.01
	0.49	2.59	0.40	18.82	0.48	5.80
	0.64	6.47	0.48	19.13	0.74	17.21
	0.82	0.84	0.73	16.82	0.80	15.26
	0.89	3.68	0.81	3.67	0.92	12.75
			0.87	6.63	0.97	4.51
<i>Bombax malabaricum</i> (Exudate)	0.14	18.99	0.01	19.32	0.16	3.90
	0.34	9.65	0.18	15.15	0.65	10.80
	0.88	11.51	0.39	8.95	0.71	27.05
	0.90	9.12	0.53	5.92	0.80	16.94
			0.67	5.17	0.93	3.19
			0.81	22.18	0.99	0.90
<i>Tinospora cordifolia</i> (Stem Extract)			0.88	23.30		
	0.09	12.26	0.01	54.30	0.09	1.12
	0.15	6.25	0.19	4.74	0.19	2.10
	0.39	6.42	0.39	11.04	0.22	2.22
	0.45	8.18	0.44	8.19	0.44	26.80
	0.68	0.93	0.77	16.88	0.59	5.40
	0.83	13.74	0.88	4.84	0.69	13.60
	0.91	5.87			0.77	19.51
					0.85	1.44
<i>Borasses flabellifer</i> (Secondary product of Fruit)					0.94	4.63
	0.05	2.64	0.05	1.00	0.27	96.93
	0.09	5.80	0.08	1.31	0.45	3.07
	0.13	5.37	0.16	6.90		
	0.16	5.38	0.25	19.09		
	0.18	11.30	0.39	13.39		
	0.24	1.77	0.47	34.38		
	0.34	10.93	0.65	6.57		
	0.38	7.68	0.67	5.23		
	0.55	9.28	0.76	7.63		
	0.59	13.72	0.86	4.19		
	0.66	7.58	0.97	0.31		
	0.77	7.44				
	0.84	4.81				
	0.87	6.31				

CONCLUSION

The present study on physicochemical parameters, preliminary phytochemical analysis and HPTLC analysis provides important information which may be useful in authentication and adulteration for quality control of the raw materials. The present study adds to the existing knowledge of the medicinal plant materials which are the ingredients of Nilappanai chooranam. Nilappanai chooranam is used to treat *Vidhanu kuraivu* (oligospermia) and *Vellai noi* (leucorrhoea). Most of the ingredients of the chooranam is used traditionally for the treatment of infertility and related conditions. This paper gives evidence based information regarding general description, vernacular names, therapeutic uses, physicochemical parameters, phytochemical constituents and HPTLC characteristics which help the researchers to investigate more about these important plant materials.

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