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A COMPARATIVE PHARMACOGNOSTICAL AND PHYTOCHEMICAL STUDY OF *RICINUS COMMUNIS LINN. SEEDS* W.S.R. TO AGRO-CLIMATIC ZONES

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ABSTRACT

Background and objectives: *Ricinus communis Linn.(Eranda)* is a widely described plant since ancient time. It is generally used in diseases like pain, inflammation, paralysis, constipation etc. It is also a content in many medicinal and herbal preparation. The drug *Ricinus communis Linn.* due to its effect and action need to be standardized and it is a need of present era where modern drugs are also standardized. The herbal drug standardization includes proper authentication, place and season of collection etc. Among above mentioned factors, place of collection plays an important role in the standardization of the drug. In Ayurveda, the Sages mentioned the concept of Desha (Agro-climatic zone) and its effect over the potency of the drug. Hence in this study, *Ricinus communis Linn. Seeds* collected from three different agro climatic zones or habitat is studied for their phamacognostic and phyto-chemical differences and compared to each other to detect the maximum potency. **Materials and methods:** For the current study botanically identified *Ricinus communis Linn. (Eranda)* seeds were collected from three different habitats, dried and stored properly for their organoleptic characters, physico-chemical, phyto-chemical and chromatographic studies were conducted. **Results:** Macroscopic study of all three samples shows difference in color, surface and size with minimum difference in odour. Microscopic study of seed of dry climatic area contains higher oil globules. Phyto-chemical analysis of all samples shows the total ash contains of dry climatic area was more than other. Wet climatic area sample moisture contains was more and low water soluble extractive values. Water soluble and alcohol soluble extractive values were higher in dry climatic area seed sample.

Chromatographic analysis shows dry climatic area sample contains more amount of fixed oil. **Interpretation and conclusion:** The results of all these seed samples of *Ricinus communis Linn.* collected from dry climatic area is found to be superior to other samples on the basis of pharmacognostic, phyto-chemical and chromatographic parameters.

KEYWORDS: Ricius Communis, Eranda, Agro climatic zone, Phyto-chemical.

INTRODUCTION

Plants, the silent workforces of our mother planet, are espoused part of all living beings. They are sowed, nurtured, protected and cared and once they reach a stage of maturity or self-sustenance they return all the good done to them in most fruitful ways. Smallest creatures to full grown species depend at all times on these. Birds build their nest in the comfort and security of plants; arboreal build their houses on them; animal feed on produces of these plants; living beings find shade and canopy under these beings. Thus, Plants are essential part of life on the Earth. They play an important role in the lives of animals as well as in humans. There are several different ways in which plant play their roles in sustenance of life on everyday basis. Thus, plants are essential part of life on the Earth. Plants extend their help in care of sick and diseased too. Our ancestors discovered various uses of plants in pacifying varied health conditions. Ayurveda – the Science of Life – finds its basis of health management and disease management in these very plants. Ayurveda declares 'each and every substance in this Universe, if used judiciously, has potential to cure illnesses and thus has medicinal attributes.'[1] The topic of standardization of Ayurvedic medicaments is "of broad and current interest". Currently it has become mandatory to give due consideration to all the dynamics which affect the potency of the drug in consideration.

Standardization of drugs of plant origin is need of the hour in order to approve its effective therapeutic value and to stand out in the crowded global market. Standardization of these drugs includes their authentication, habitat or agro climatic zones, collection-season and such others. Among these, site of collection of the useful part of the plant plays an imperative role to assure the quality of drug. After a thorough observation through keen eyes it was concluded that the geographical variation and climate of the habitat of the drug may be the major factor in influencing its potency.

Hence for the current study drug *Ricinus communis Linn.* Seeds were collected from *wet climatic area, dry climatic area and mixed climatic area.*

Ayurveda – the Science of Life – is the oldest among all the systems of medical and health practices. Lord Brahma recollected its basics and transferred it through a lineage of Sages for the uplifting of humanity.[2] Ayurveda provides a complete and holistic system of preventive and curative medicine. Ayurveda treats its patient as a whole rather than treating his disorder or illness as separate entity.

Nowadays we have to endorse this overlooked and untouched part of Ayurveda, and give due consideration to not only accessibility to drugs but also to ecological factors like earth, rainfall, temperature, time of year and their several effects on drug. So, here an attempt is been made to find out authenticity behind the effect of diverse regions on quality and action of drug which are collected from different regions. In ancient times, physicians took efforts to collected raw materials on their own to prepare the required medicines but now-a-days in the present era it is not feasible due to lack of time, space, human resources and mechanized work. Now-a-days Ayurvedic practitioners depend on professionals to get raw herbal materials or formulations for more effective treatment. For this the fundamental principles need to be practiced.

For current study drug *Ricinus communis Linn.* or castor commonly known as Eranda in Sanskrit which is a fast- growing, suckering perennial shrub which can reach the size of a small tree (around 2-4 meters) belongs to Euphorbiaceae family. It is native to the Ethiopian region of tropical east Africa, castor plant has become naturalized in tropical and warm temperate regions throughout the world. It is found throughout India, cultivated and found wild.

Ricinus communis Linn. is a tall evergreen, glabrous and glaucous annual sometimes shrubby or almost small tree, 2-4 m high; found throughout India, mostly growing wild on wasteland and also cultivated for its oil seeds. Fruit is blunt, greenish, deeply-grooved, tricoccus capsule, less than an inch long, with the prominences of the ovary becomes sharp, weak, spreading spines, 3-celled, dehiscing loculicidally and septic dally into 6 valves. Seeds are ovoid, flattened, nearly ⅝ inch long by ¼ broad, smooth, shining, pinkish- grey, prettily mottled with dark brown, caruncle large, sub-globular, raphe faintly raised, running down center of ventral surface, embryo large in axis of the endosperm, cotyledons foliaceous, broadly ovate, with a cordate base, veined. The plant has various pharmacological activities such as anti inflammatory, anti bacterial, anti microbial, hepato-protective, anti allergic, anti oxidant, anti fertility.[3]

Different classes of phyto-chemicals have been reported from various parts of the plant such as -

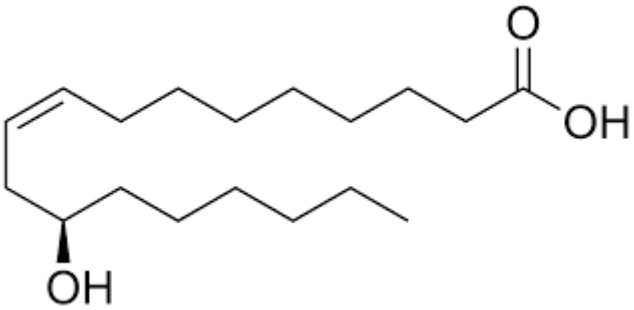
Phyto-chemistry[4]

a) Contents of Seed

Table No. 1

Component	Percentage
Fixed oil	45%
Palmitic	1.2%
Stearic	0.7%
Arachidic	0.3%
Hexadecenoic	0.2%
Oleic	3.2%
Linoleic	3.4%
Ricinoleic	89.4%
Linolenic	0.2%
Moisture	5.1-5.6%
Protein	12.0- 16.0%
Ash	2.0-22.%

- Alkaloids
- Terpenoids
- Cardiac glycosides
- Tannins
- Steroids
- Saponins
- ergost-5-en-3-ol
- Stigmasterol
- Sitosterol
- fucosterol
- probucol



Ricinoleic ($C_{18}H_{34}O_3$)

b) Contents of Leaves

- Alkaloids ricinine and N-demethylricinine
- Flavones glycosides
- Monoterpenoids
- Sesquiterpenoid
- Gallic acid
- Quercetin
- Gentisic acid
- Rutin
- Epicatechin
- Ellagic acid

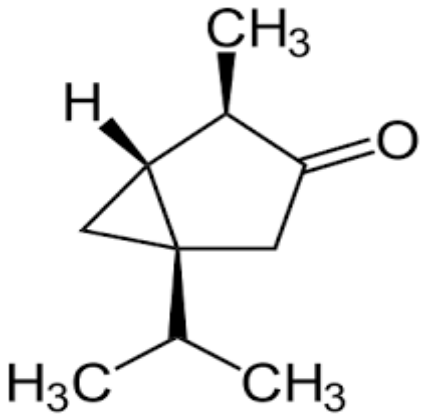
Contents of Root

- Indole-3-acetic acid

c) Contents of Seed oil-

Table No. 2

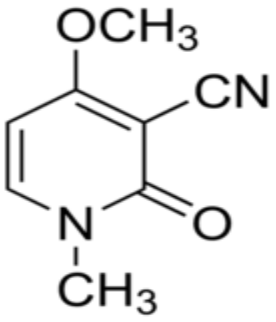
Essential oil	Percentage
α-thujone	31.71%
1,8-cineole	30.98%
α-pinene	16.88%
Camphor	12.92%
Camphene	7.48%



α-thujone ($C_{10}H_{16}O$)

d) Contents of Stem

- Ricinine



Ricinine ($C_8H_8N_2O_2$)

Toxicity

The seeds contain 2.8–3% toxic substances. The principal toxin is the albumin, ricin. However, it produces antigenic or immunizing activity, producing in small doses an antitoxin analogous to that produced against bacteria. The seeds from the *Ricinus communis* Linn. are poisonous to people, animals and insects. One of the main toxic proteins is "ricin".

It is said that just one seed can kill a child. Children aremore sensitive than adults to fluid loss due to vomiting and diarrhoea, and can quickly become severely dehydrated and die. Perhaps just one milligram of ricin can kill an adult. The symptoms of human poisoning begin within a few hours of ingestion and they are abdominal pain, vomiting, diarrhea, sometimes bloody. Within several days severe dehydration, a decrease in urine and a decrease in blood pressure occurs.

MATERAILS AND METHODS

Drug *Ricinuscommunis Linn.* was collected from three different agro climatic zone for pharmacognostic and phyto-chemical analysis.

Collection of raw materials

The three samples of seeds of *Ricinus communis Linn.* were collected from the different places mentioned below:-

1) **Sample A**

- Agro Climatic zone – Dry climatic area
- Place – Bellary (Karnataka)
- Location – $15^{o}06'N76^{o}55'E$
- Bellary is situated in Northern Dry Zone of Karnataka and is a district place of state.

- The temperature start rising from March and will be on peak in April around 46^{o}C and average temperature will be around 32.22^{o} C.
- The annual average rainfall is 647 mm.
- The soil is Sandy loam soil mixed with black and grey soil.
- Soil type- Mixed red and black soil.

2) Sample B

- Agro Climatic zone – Wet climatic area
- Place – Udupi (Karnataka)
- Location - 13.3389°N 74.7451°E
- Udupi is situated in coastal zone of Karnataka and it is district of the state.
- Annual average temperature is around 31.5^{o}C.
- The monsoon period is from June to September with one of the rainfall averaging more than 4000mm every year and heavy winds.
- Soil type – Red laterite soil, yellow loamy soil

3) Sample C

- Agro Climatic zone – Mixed climatic area
- Place – Tumakuru (Karnataka)
- Location - 13.34°N 77.1°E
- Tumakuru is situated in Eastern dry zone of Karnataka and it is district of the state.
- The average annual temperature is around 40^{o} Cand starts in January and will be on peak in May.
- The average annual rainfall is 679.2 to 888.9 mm.
- Soil color is dark red.
- Soil type – Red loamy.

Sampling of the Drug

Sample were labeled as follows:

Table No. 3

Samples collected from Bellary	A
Samples collected from Udupi	B
Samples collected from Tumakuru	C

Time of collection

Seeds of *Ricinus communis Linn.* were collected in the month of-

1. Sample A – Dec. 2016
2. Sample B – Jan. 2017
3. Sample C – Jan. 2017

Method of preparation of sample

1. The fresh sample of *Ricinus communis* seeds were taken from three different habitat and were dried in shade at temperature of 30 to 35oC for 15 to 20days.
2. After that dried sample (seeds) were ground to fine powder separately with the help of electric grinder.
3. The result of electric grinding was thick sticky mass which showed that a considerable amount of oil or fatty acid was present in seeds of *Ricinus communis.*

Table No. 4

Sample weight	Sample A	Sample B	Sample C
Initial weight of seed (gm)	1250	1100	1040
After cleaning and drying (gm)	1180	930	1000
After grinding (gm)	1170	920	980

The samples were carefully stored in airtight polythene bags and labeled as A,B,C.

Objectives

(1) Pharmacognostic study of geographical sources of *Ricinus communis Linn.* Seeds.

(2) Phytochemical analysis of geographical sources of *Ricinus communis Linn.* Seeds.

For the pharmacognostic study the macroscopic and microscopic study were done in detail sources of *Ricinus communis Linn.* Seeds.

Further the Phyto-chemical study was carried out for the evaluation of raw drug helps in the identification of a drug as well as purity and quality of the drug. Now-a-days the Phyto-chemical study is done by separation of different content with help of chemical and physical instrumentation. The physical standards help in the assessment of crude drugs. The physical standards of drug can be assessed by assessment of moisture content, specific gravity, density optical rotation, refractive index, viscosity and solubility in different solvents etc.

A) Determination of foreign matter

Method

100 gm of sample is weighed by the electronic balance and spread on a white tile uniformly without over lapping. Inspected the sample with naked eyes and by means of a 6x lens. The foreign matter separated manually. After complete separation, the drug sample was re-collected and weight again.

B) Determination of moisture content (Loss on drying)

Method of determination of moisture content:

1. Weight about 1.5 gm. of the powdered drug into a weighted flat and thin porcelain dish.
2. Dry in oven at 100^{o} C or 105^{o}.
3. Cool in a desiccator and watch.
4. The loss of weight is usually recorded as moisture.

Weight of the Empty Petri dish = W 1 gm

- Weight of the Drug Sample = X gm
- Wt. of the Petri dish with drug before drying (W3) = (W1+X)
- Weight of Petri dish after Drying = W2 gm
- Loss on Drying in % = (W3-W2/X)*100

C) Ash Values

Determination of Total Ash:

1. Three crucibles were cleaned, dried well and then weight to constant weight and labeling was made A1, B1, and C1.
2. 2 gm of the powdered drug sample were then weighed and placed in the Silica Crucibles respectively.
3. Then are kept in Muffle furnace at 450^{0}C. These are heated on burner using a flame about 2 cm. high and supporting the crucible about 7 cm. above the flame.
4. The crucibles containing the ash were allowed to be cooled in a desiccators and weighted the ash and calculated the percentage of total ash with reference to the air dried sample of the crude drug.

- **Calculation**

Wt. of Empty Silica Crucible = X

Wt. of Sample (X) = Y

Wt. of the Crucible + Ash (after complete incineration = Z

Wt. of the ash = (z-x)g

'y' g of the crude drug gives (z-x) g of the ash

100 g of the crude drug gives 100/y*(z-x) g of the ash

Percentage of Total Ash of the sample = 100(z-x)/y%

D) Extractive values

Determination of Alcohol-soluble extractives:

1. About 5 gm of powdered drug weighted in a weighing bottle and transferred in to a dry 250 ml. conical flask.
2. 100 ml. graduated flask is filled to delivery mark with the solvent (90% alcohol). The weighing bottle is washed and poured the washings, together with the remainder of the solvent into the conical flask.
3. Cork the flask and set aside for 24 hours, shaking frequently.
4. Filtered into a 50 ml cylinder. After sufficient filtrate is collected, 25 ml of the filtrate is transferred to a weighted, thin porcelain dish.
5. Evaporated to dryness on a water-bath and complete the drying in an oven at 100^{o}C and then cooled in a desiccators and weighed.
6. The percentage of w/w of extractive with reference to the air dried drug is calculated.

Calculation

25 ml. of alcoholic extract gives = x g of residue

100 ml. of alcoholic extract gives = 4x g of residue

5 g of air dried drug gives- 4x g of alcohol (90%) soluble residue.

100 g of air dried drug gives- 80x g of alcohol (90%) soluble residue.

Alcohol (90%) soluble extractive value of the sample = 80x%.

- Determination of water-soluble extractives:

This method is having similar procedure but here chloroform water is used instead of alcohol. Chloroform also acts as a preservative.

E) Determination of pH value

2g of Sample A, B and C was poured one by one into a clean dry 25ml beaker and 13ml of hot distilled water was added to the sample in the beaker and stirred slowly. It was then cooled in a cold-water bath to 25°C. The pH electrode was standardized with buffer solution

and the electrode immersed into each sample and the different pH value was read and recorded.

- **Chromatographic techniques**

Chromatography is a process in which a chemical mixture carried by a liquid or gas is separated into components as a result of differential distribution of the solutes as they flow around or over a stationary liquid or solid phase.

i) Thin Layer Chromatography

Thin-layer chromatography (TLC) is a chromatography technique used to separate non-volatile mixtures. Thin-layer chromatography is performed on a sheet of glass, plastic, or aluminum foil, which is coated with a thin layer of adsorbent material, usually silica gel, aluminum oxide (alumina), or cellulose. This layer of adsorbent is known as the stationary phase. After the sample has been applied on the plate, a solvent or solvent mixture (known as the mobile phase) is drawn up the plate via capillary action. Because different analytic ascend the TLC plate at different rates, separation is achieved.

TLC is useful in analysis of alkaloids, glycosides, isoprenoides, lipid components, sugar derivatives and practically all bio constituents.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Ethylacetate (95 : 5) shows under U.V. (366 nm) a fluorescent spot at Rf. 0.95 (sky blue). On exposure to Iodine vapour seven spots appear at Rf. 0.39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95 (all yellowish brown). On spraying with 5% Methanolic-Sulphuricacid reagent and heating the plate for about ten minutes at 105°C seven spots appear at Rf. 0.39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95 (all brown).

ii) High Performance Thin Layer Chromatography

High-performance thin-layer chromatography (HPTLC) is an enhanced form of thin-layer chromatography (TLC). A number of enhancements can be made to the basic method of thin-layer chromatography to automate the different steps, to increase the resolution achieved and to allow more accurate quantitative measurements.

Automation is useful to overcome the uncertainty in droplet size and position when the sample is applied to the TLC plate by hand. One recent approach to automation has been the use of piezoelectric devices and inkjet printers for applying the sample.

The spot capacity (analogous to peak capacity in HPLC) can be increased by developing the plate with two different solvents, using two-dimensional chromatography. The procedure begins with development of sample-loaded plate with first solvent. After removing it, the plate is rotated 90° and developed with a second solvent.

The TLC plate which was prepared for the thin layer chromatography were placed inside the HPTLC visualizing chamber under uv rays for observation of spot. Then it is transferred to the HPTLC scanner for scanning the TLC plate and auto report generation under 254 and 366 nanometer.

Chromatographic conditions: The following chromatographic condition was established by trial and error and was kept constant throughout the experimentation.

HPTLC	: CAMAG Linomat 5
Executed by	: Anchrom
Plate size	: 20.0*10.0 cm.
Material	: HPTLC plate silica gel 60 F 254
Mobile Phase	: Chloroform :Ethylacetate (95:5)
Detection Wavelength	: 254 mm.
Scanning speed	: 20mm/sec.

RESULT AND DISCUSSION

Macroscopic Study

1. From the aspect of organoleptic view, on perception all the samples was sweet in taste caused coating in oral surface. While grinding, the sample of wet climatic area caused much more irritation in nose and throat that has lasted for more time as compared with others.
2. Surface area of seeds of dry climatic area is more than others.
3. Macroscopically three samples differed in color. This color change was noticeable.

Microscopic Study

Transverse section of seeds: Seed shows a hard testa, membranous tegmen, a fleshy endosperm, and thin embryo with flat, broad cotyledons; testa consists of hard, single layered epidermis, radially elongated, compactly arranged, slightly curved tabular cells, having reddish brown contents followed by 8-10 layered, tangentially elongated parenchymatous cells, most of them containing oil globules, fibro-vascular bundles found scattered in this

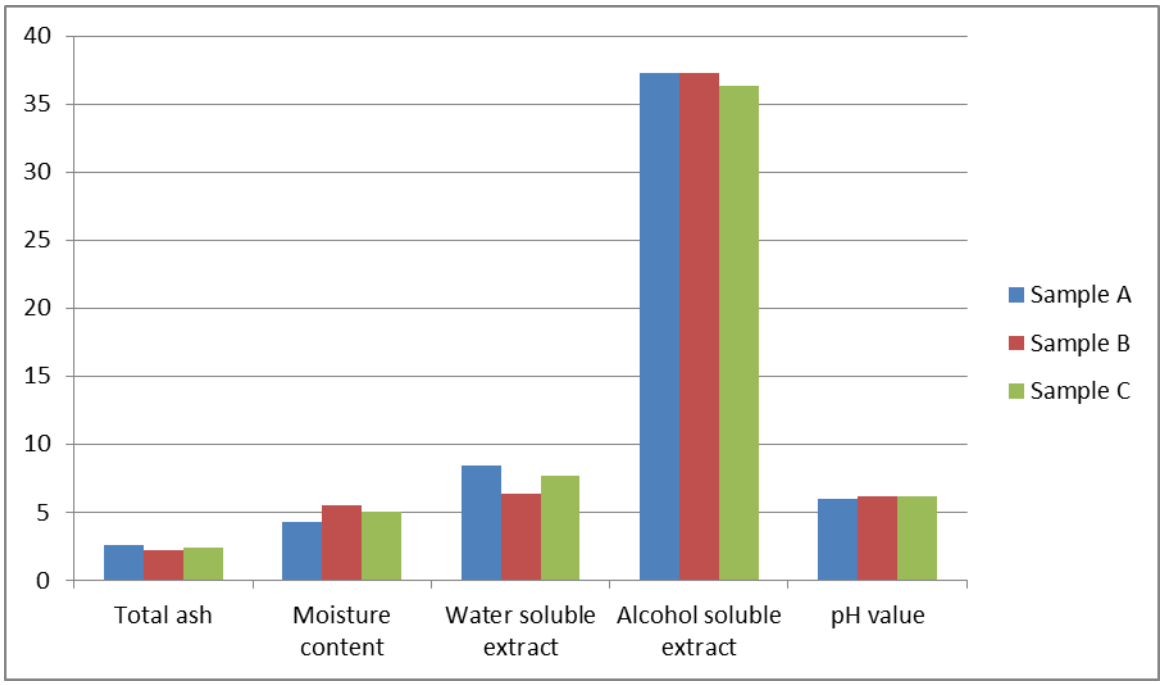
zone; endosperm consisting of oval, irregular cells filled with oil globules, abundant aleurone grains, thin, flat and leafy. All the sample shows same structure in T.S., but sample B shows more oil globules and sample A shows lesser oil globules compared to sample C.

Observation of all samples

Table No. 5

Sr. No.	Parameters	Values			API Value
		Sample A	Sample B	Sample C	
1	Total Ash	2.56	2.21	2.38	Not more than 4%
2	Moisture content	4.29%	5.51%	5.07%	---------
3	Water Soluble Extractive	8.44%	6.37%	7.64%	Not less than 6%
4	Alcohol Soluble Extractive	37.31%	37.28%	36.38%	Not less than 36%
5	pH Value	5.98	6.21	6.14	----------

This shows that total ash value, moisture contain, water soluble extractive, alcohol soluble extractive and pH values. Total ash value, water soluble extractive, alcoholic soluble extractive and pH value of dry climatic area i.e. sample A is highest than other samples and moisture contain of wet climatic area i.e. sample B are highest than other samples.



Observation of all samples

Graph No. 1

Phytochemical study

Table No. 6

Phytochemical Constituent	Sample A	Sample B	Sample C
Alkaloids	+++	+	++
Terpenoids	++	+	+
Cardiac glycosides	++	+	++
Tannins	+++	+	++
Flavonoids	-	-	-
Steroids	++	+	+
Saponins	++	+	++
Anthraquinone	-	-	-
Reducing sugar	-	-	-
Oil	++++	++	+++

Chromatographic Analysis

1) Thin Layer Chromatography

Sample A - The scanning of TLC plates shows:

Table No. 7

Sr. No.	RF Value	Color
1st	0.95	Sky blue
UV 254nm		
1st	0.95	Sky blue
UV 366nm		
1st	0.95	Sky blue
2nd	0.89	Sky blue
3rd	0.80	Sky blue
Iodine Chamber		
1st	0.95	Yellowish brown
2nd	0.89	Yellowish brown
3rd	0.80	Yellowish brown

Sample B - The scanning of TLC plates shows:

Table No. 8

Sr. No.	RF Value	Color
1st	0.89	Sky blue
UV 254 nm		
1st	0.89	Sky blue
UV 366nm		
1st	0.89	Sky blue
2nd	0.89	Sky blue
3rd	0.80	Skyblue
Iodine Chamber		
1st	0.88	Yellowish brown
2nd	0.87	Yellowish brown
3rd	0.86	Yellowish brown

Sample C - The scanning of TLC plates shows:

Table No. 9

Sr. No.	RF Value	Color
1st	0.88	Sky blue
UV 254 nm		
1st	0.88	Sky blue
UV 366nm		
1st	0.88	Sky bule
2nd	0.82	Sky blue
Iodine Chamber		
1st	0.88	Yellowish brown
2nd	0.82	Yellowish brown

Common sports seen in all the samples with equal or relative Rf:

Table No. 10

Sample	Rf Value
Sample A	0.95
Sample B	0.88
Sample C	0.88

Common in sample B & C: 0.88, 0.88.

Most probably, 2 closely related components are similar.

High Performance Thin Layer Chromatography

The scanning plate in HPTLC shows following results-

Table No. 11

Peak	Sample A	Sample B	Sample C
Start Rf	0.64	-0.02	0.05
Start Height	152.1	59.7	74.5
Max Rf	0.65	0.04	0.10
Max Height	157.0	95.1	248.5
Max %	31.36	19.00	49.64
End Rf	0.85	0.05	0.15
End Height	46.9	77.8	144.6
Area	16084.8	3327.5	8925.4
Area %	56.76	11.74	31.50

The area of sample A is more about 56% than the other samples and the area of sample B is less in all the three samples about 11.74%.

DISCUSSION

Pharmacognostic study

The colors of sample were different which can be seen macroscopically. The sample A is light brown, sample B is Dark maroon brown and sample C is yellow brown in color. The taste of all three samples is sweet and causes coating in the mouth but the odour is strong in wet climatic area sample than the other samples.

The shape of all three samples is oval but the size of sample A is bigger than the other samples. The transverse section on microscopic study shows more oil globules in the sample A than the other. The sample A is also more sticky due to the presence of more amount of oil.

Phyto-chemical & Physico-chemical study

The Phyto-chemical study of the drug such as moisture content, ash value, alcohol soluble extract, water soluble extract, thin layer chromatography and high performance thin layer chromatography done as per the procedure mentioned in API. The different constants were observed with different value in all the three samples.

Total Ash Value

The ash value is the presence of the inorganic matter in the drug on heating at particular temperature. The ash value of sample A, B & C is found 2.56%, 2.21% and 2.38% respectively. The ash value of Sample A is highest than the other samples.

Moisture Content

The moisture content represents the presence of the water molecule in a particular drug. Here the moisture content of sample A, B & C is found 4.29%, 5.51% and 5.07% respectively. The moisture content in the sample B, which was collected from wet climatic area is highest.

Water-soluble extract

The extractive values of a drug are useful for evaluation of a crude drug and gives idea about the nature of the chemical constituents present in a crude drug. The water-soluble extractives of the drug sample A, B & C are 8.44%, 6.37% & 7.64% respectively. The sample A is having highest water-soluble extracts.

Alcohol soluble extract

The study of the drug sample A, B & C for alcohol soluble extract shows 37.31%, 37.28% and 36.38% respectively. The value of dry climatic sample is higher than the other samples.

The sample A collected from the dry climatic area shows higher aqueous and alcohol extractive values because it is having more amount of chemical and active principles than the sample B collected from wet climatic area and Sample C collected from mixed climatic area.

pH value

The pH value is helpful for the determination of nature of the principle present inside the drug that it is acidic and alkaline in nature. The pH value study of drug sample A, B & C show 5.98, 6.21 and 6.14 value respectively. The pH value of sample A collected from dry climatic area is lowest compared to other samples shows the presence of more acidic active principle.

Element ash analysis

The analysis of ash for qualitative value shows presence of Phosphorus in all three sample of *Ricinus communis Linn.* Seeds.

Preliminary phyto-chemical analysis

The preliminary phyto-chemical analysis shows the presence of steroids, saponins, alkaloids, flavonoids, and glycosides.

Chromatographic Analysis

Ricinoleic acid is the active principle present in the fixed oil of *Ricinus communis Linn.* Seeds which is causing purgation. External application of oil acts as anti-inflammatory and analgesic.

Thin Layer Chromatography

Thin Layer Chromatography of the drug done under alcoholic extract on Silica gel 'G' plate using Chloroform: Ethylacetate (95 : 5) and the Rf values of all the three samples were noted as –

Table No. 12

Sample	Rf Value
Sample A	0.95
Sample B	0.88
Sample C	0.88

Highest no. of spots were noted in sample A.

HPTLC- High Performance Thin Layer Chromatography

The TLC plate which was prepared for the thin layer chromatography were placed inside the HPTLC visualizing chamber under uv rays for observation of spot. Then it is transferred to the HPTLC scanner for scanning the TLC plate and auto report generation under 254 and 366 nanometer. The auto generation of report shows following observation in all the three samples-

Table No. 13

Sample	A	B	C
Area	16084.8	3327.5	8925.4
Area Percentage	56.76	11.74	31.50

Ricinoleic acid is the active principle of the *Ricinus communis Linn.* seeds oil. Sample A shows the higher concentration of ricinoleic acid than the sample B and C.

CONCLUSION

The sample A collected from the dry climatic area is found more better because of the more extractive values and low moisture content. On observing with the microscope, the oil globules are also found more than the other samples. On chromatographic study sample A shows more area percentage because of the presence of more active principles.

So the hypothesis that castor oil taken out of the *Ricinus communis Linn.* seeds collected from the dry climatic area might be more potent and found more better and superior due to presence of more active principles based on the pharmacognostic and phyto-chemical study.

Hence *Ricinus communis Linn.* Seeds should be collected from dry climatic area for the therapeutic and medicinal use. This study also represents the concept of climatic area or agro-climatic zone that it also influences the potency of the drug.

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REFERENCES

1. Agnivesha, Charak Samhita, Sutra Sthana, Chapter 26, Shlok no. 12, Dr. RK Sharma and Bhagwan Dash, Choukhambha Sanskrit Series Office, Varanasi, 1999; P-453.

2. Vagbhat, AshtangHridaya, Sutra Sthana, Chapter 1, Shlok no. 3-4, Dr. Brahmanand Tripathi, Reprint, Chaukhambha Sanskrit Pratishthan New Delhi, 2012; P-4.
3. Manpreet Rana1, Hitesh Dhamija, Bharat Prashar, Shivani Sharma, Ricinus communis L.- A Review, Vol. 4, No. 4,International journal of PharmTech research, Manav Bharti University, 2012; P-1706-1711.
4. Jitendrajena and Ashish Kumar Gupta, RicinusCommunis- A Phytophamacological review, International journal of pharmacy and pharmaceutical sciences, 2012.