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HEAVY METALS, N.P.K AND PHYTOCHEMICAL ANALYSIS OF CRUDE LEAF EXTRACT OF INDIAN DATE (*ZIZIPHUSJUJUBA*)

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ABSTRACT

Ziziphus genus, belongs to Rhamnaceae family, is traditionally used to cure various human ailments. The root barks of Ziziphusnummularia are reported to have sedative-hypnotic, antipyretic and analgesic purposes [1]. In traditional Chinese medicine, suanzaoren (Ziziphusspinosa) is believed to nourish the heart, and supplement to the liver blood. It is used to treat irritability, insomnia and heart palpitations [2-5].In Saudi Arabian folk medicine, the leaves of Ziziphusspinachristi (jujube) are used to heal wounds, treat some skin diseases, some inflammatory conditions, sores, against ringworm, fever, gonorrhea, sex diseases and ulcers. The decoction of the bark and fresh fruits is used as a body wash, used to promote the healing of fresh wounds and also used to cure dysentery, bronchitis, cough and tuberculosis [6-9]. Leaves of Ziziphusjujuba Mill. (Z. jujuba) were used as a folk medicine to treat children suffering from typhoid fever, furuncle and ecthyma in China[10]. Ziziphusjujuba Mill. Var. spinosa (Z. jujuba) seeds have attracted much attention within the field of medicine due to their significant effects against disturbances of the central nervous system. Secondary metabolites composition is key to the influence of the pharmaceutical and commercial qualities of this plant[11].

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*This Present study of Heavy metals, N. P. K and Phytochemical evaluation have been performed which clearly reveals the occurrence of heavy metals shows the highest amounts was that of Ca (814.31mg/kg), followed by Mg (382.92mg/kg**),** whereas the least amount was that of Ni (3.62 mg/kg). N.P.K. analysis shows the highest percentage was that of nitrogen in Ziziphus jujube leaves, followed by potassium; the least percentage of Phosphorus.The results of the study possibly will subsist positive in surroundings several diagnostic indices designed for the discovery and research of a monograph of the plant.*

Key words: Heavy metal, Phytochemical, Indian date, *Ziziphus jujube.*

Introduction:

Ziziphus jujube plant has been introduced in Madagascar and grows as an invasive species in the western part of the island. This plant is known as the "hinap" or "finab" in the eastern part of Bulgaria where it grows wild but is also a garden shrub, kept for its fruit. The fruit is picked in the autumn. The trees grow wild in the eastern Caribbean, and are reported to exist in Jamaica, The Bahamas, Guyana and Trinidad as well. In Antigua and Barbuda and Guyana, the fruit is called "dumps" or "dums"; and in The Bahamas and Guyana, "juju". It is also known as "pommesurette" on the French islands of the Caribbean. This fruit, more precisely known as "Indian jujube" elsewhere, is different from the "jujube" fruit that is cultivated in various parts of southern California.[12][13] Altun Ha an ancient Mayan city in Belize, located in the Belize District about 50 kilometres (31 mi) north of Belize City and the surrounding woods also boasts some jujube tree and shrub varieties where it is referred to as plums for lack of a better word among locals.

It is a small deciduous tree or shrub reaching a height of 5–12 metres (16–39 ft), usually with thorny branches. The leaves are shiny-green, ovate-acute, 2–7 centimetres (0.79–2.76 in) long and 1–3 centimetres (0.39–1.18 in) wide, with three conspicuous veins at the base, and a finely toothed margin. The flowers are small, 5 mm (0.20 in) wide, with five inconspicuous yellowish-green petals. The fruit is an edible oval drupe 1.5–3 centimetres (0.59–1.18 in) deep; when immature it is smooth-green, with the consistency and taste of an apple, maturing brown to

purplish-black, and eventually wrinkled, looking like a small date. There is a single hard kernel, similar to an olive pit,[14]containing two seeds.

The species has a curious nomenclatural history, due to a combination of botanical naming regulations, and variations in spelling. It was first described scientifically by Carl Linnaeus as *Rhamnuszizyphus*, in *Species Plantarum* in 1753. Later, in 1768, Philip Miller concluded it was sufficiently distinct from *Rhamnus* to merit separation into a new genus, which he named *Ziziphus jujube*, using Linnaeus' species name for the genus but with a probably accidental single letter spelling difference, "i" for "y". For the species name he used a different name, as tautonyms (repetition of exactly the same name in the genus and species) are not permitted in botanical naming. However, because of Miller's slightly different spelling, the combination the earlier species name (from Linnaeus) with the new genus, *Ziziphuszizyphus*, is *not* a tautonym, and was therefore permitted as a botanical name. This combination was made by Hermann Karsten in 1882.[15][16] In 2006, a proposal was made to suppress the name *Ziziphuszizyphus* in favor of *Ziziphusjujuba*,[17] and this proposal was accepted in 2011.[18] *Ziziphusjujuba* is thus the correct scientific name for this species.

The tree tolerates a wide range of temperatures and rainfall, though it requires hot summers and sufficient water for acceptable fruiting. Unlike most of the other species in the genus, it tolerates fairly cold winters, surviving temperatures down to about −15 °C (5 °F). This enables the jujube to grow in mountain or desert habitats, provided there is access to underground water throughout the summer. The jujube, *Z. jujuba* grows in cooler regions of Asia. Five or more other species of *Ziziphus* are widely distributed in milder climates to hot deserts of Asia and Africa.[19]

The freshly harvested, as well as the candied dried fruit, are often eaten as a snack, or with coffee. Smoked jujubes are consumed in Vietnam and are referred to as black jujubes.[20] Both China and Korea produce a sweetened tea syrup containing jujube fruit in glass jars, and canned jujube tea or jujube tea in the form of teabags. To a lesser extent, jujube fruit is made into juice and jujube vinegar. They are used for making pickles in west Bengal and Bangladesh. In China, a wine made from jujube fruit is called *hongzaojiu*.

Traditionally in India, the fruit is dried in the sun and the hard nuts are removed. Then, it is pounded with tamarind, red chillies, salt, and jaggery. In some parts of the Indian state of Tamil Nadu, fresh whole ripe fruit is crushed with the above ingredients and dried under the sun to make cakes called *ilanthaivadai* or *regivadiyalu* (Telugu).[21] It is also commonly consumed as a snack.

Material and methods:

Plant material

Indian date (*Ziziphus jujube)*leaves were collected in June 2018 from an Indian dated tree in Berbice Campus Tain Compound, Guyana. The collected leaves were shadow dried and then powdered by using Thomas-Wiley Laboratory Mill Model 4 at Johns Science Center, Berbice Campus, and University of Guyana. The powdered samples (100g) were stored in airtight brown coloured bottles in dry conditions throughout the experiments.

Phytochemical analysis:

The preliminary phytochemical analysis of leaf extracts of *Z. jujube* were performed by Harbone (1998) and Dey et al., (1987) were evaluated for the presence of phytochemicals such as alkaloids, flavonoids, saponins, phenols, steroids, tannins, triterpenoids, glycosides, carbohydrates, phlobatannins, thiols, anthroquinone, protein and amino acids, resins, fixed oils & fats and phytosterols. The qualitative determination of these secondary metabolites was carried out by standard methods [22]. Chromatographic study of the different extracts was also done using standard methods [23].

Heavy metals and N.P.K.analysis:

Crude leaves powder was used in Gas Chromatography/Mass Spectrometry (GC/MS) to analyse heavy metals such as Zn, Cu, Ni, Mn, Fe, Ca, Cr and Mg at acceptable levels. The Nitrogen (N), Phosphorous (P) quantitative test was done by total Kjeldal digests by UV-VIS spectrophotometry and Potassium (K) in Kjeldhal digest by Flame photometry method at Central Agricultural Laboratory, Guyana Sugar Corporation Inc. La Bonne Intention (LBI), Guyana. .

Result and Discussion;

Qualitative estimation of phytochemicals was performed in leaves of *Z. jujube*. The results were tabled and represented as '+' for presence and '–'for absence of the phytochemicals in Table 1. Quantitative analysis was done to determine in the presence of heavy metals in leaves of *Z. jujube*by using Gas Chromatography/Mass Spectrometry (GC/MS). Heavy metals estimated in mg per kg in Table 2, and analysis N.P. K in % Table in 3.

Table 1. Phytochemical analysis in the leaves of *Z. jujube*

Plant Name	Part used	Phytochemicals names	Presence (+)/Absence (-)
Ziziphus jujube	Leaves	Alkaloids	+
		Flavonoids	+
		Tannins	+
		Thiols	-
		Amino acids	+
		Carbohydrates	+
		Phenols	+
		Glycosides	-
		Triterpenoids	+
		Fixed oils, fats	-
		Proteins	+
		Saponins	+
		Steroids	-
		Phlobatannins	-
		Anthroquinone	-
		Resins	+
		Phytosterols	+

Qualitative estimation of phytochemicals in leaves of *Z. jujube*show that Alkaloids, Flavonoids, Tannins, Amino acids, Carbohydrates, Phenols, Triterpenoids, Saponins, Resins and Phytosterols are present, whereas Thiols, Glycosides, Fixed oils, fats, Steroids, Phlobatannins and Anthroquinone phytochemicals are absent.

Table 2. Heavy metal analysis in *Z. jujube*leavesin mg/ kg

Name of plant	Used part	Parameter	Mg/kg
Ziziphus jujube	Leaves	Zn	**17.97**
		Cu	**5.45**
		Ni	**3.62**
		Mn	**24.44**
		Fe	**256.59**
		Ca	**814.31**
		Mg	**382.92**
		Cr	**12.04**

Heavy metal analysis was done in leaves of *Z. jujube*by using Gas Chromatography/Mass Spectrometry (GC/MS). It shows the highest amounts was that of Ca (814.31mg/kg), followed by Mg (382.92mg/kg**),** whereas the least amount was that of Ni (3.62 mg/kg).

Table 3. N.P. K. analysis in *Ziziphus jujube*leavesin percentage (%)

Name of plant	Used part	Parameter	(%)
Ziziphus jujube	Leaves		
		N	**2.76**
		P	**0.20**
		K	**1.40**

N.P.K. analysis shows the highest percentage was that of nitrogen in *Ziziphus jujube*leaves, followed by potassium; the least percentage of Phosphorus.

Conclusion:

The antioxidant and antimicrobial activity of *Z. jujube*leaves has been reported worldwide, but it has not been possible to establish a relationship with the chemical composition due to the scanty information availed. In this study, we detected eight components of heavy metals not previously reported, and confirmed the high Ca and Mg presence in *Z. jujube*leaves. In addition high percentage of nitrogen and some useful phytochemcials are available in *Z.*

*jujube*leaves. This information give light to the present intention to find chemical proof that supports the pharmacological activities of *Z. jujube*leaves.

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