

# Pharmaceutical standardization of *Palasha Kshara* (alkali extract of *Butea monosperma* Lam.) prepared from two combinations

---

## Abstract

**Introduction:** Standardization in herbal pharmaceuticals is needed in order to ensure their quality and acceptability of final medicament prepared from them. There are many plants have been suggested in the compendia for *Kshara* (alkali extract) preparation. *Acharya Bhavamishra* coined the name of plant *Palasha* (*Butea monosperma* Lam.) as *Kshara Shrestha* means the one which is best of all *Kshara*. Generally all parts of plant together (*Panchanga*) have been suggested to be used for *Kshara* preparation in the texts. But considering the unavailability of all parts of the *Palasha* throughout the year this study has been designed to standardize the *Palasha Kshara* prepared from two combinations.

## Aim and Objectives:

Pharmaceutical and analytical standardization of *Palasha Kshara* PK-1 and PK-2 prepared from two combinations.

PK-1 is the *Palasha Kshara* prepared from combination of ashes of roots, stems, leaves, flowers and fruits.

PK-2 is the *Palasha Kshara* prepared from combination of ashes of roots, stems and leaves.

**Observation and results:** The total yield percentage of PK-1 and PK-2 were 20.757% and 4.067% respectively. Both PK-1 and PK-2 were found alkaline in nature having ph value of 10.44 and 10.47 respectively. The ICPAES study of both PK-1 and PK-2 reveals maximum amount of potassium in them (41.65% and 47.51% respectively.) Heavy metals such as arsenic, lead, mercury, and cadmium were not detected or were found to be within acceptable ranges. The XRD study reveals presence of more functional groups in PK-2 than PK-1. The observed crystallinity of PK-1 was more (87.5%) than PK-2 (84.6%).

**Discussion and conclusion:** Two varieties of *Palasha Kshara* were made in this study using two different combinations of ashes. This was an attempt to identify the need of *Kshara* prepared from all five parts of *Panchanga* over the *Kshara* prepared from three parts (roots, stems and leaves) and standardize them pharmaceutically and analytically.

**Keywords:** *Palasha*, *Butea monosperma* Lam, *Panchanga*, *Kshara*, standardization, ICP-AES, XRD

## Introduction:

Since the beginning of human civilization health has been the prime factor for the mankind. Humans are blessed with various natural resources in the form of herbs, metals, minerals and animal products for their consumption. Uses of these resources as medical treatment are globally known in maintaining the health of the healthy persons and to treat patients. There are many paths shown by *Ayurveda* for utilization of these resources in medical treatment since ancient time. The pharmaceutical branch of *Ayurveda*, “*Rasashastra* and *Bhaishajya Kalpana*”, has described use as well as method of utilization of these resources in a detail manner by formulating various medicines to treat human diseases.<sup>1</sup> One method of medicine preparation among such formulation is *Kshara Kalpana* (alkaline preparation). *Kshara* (alkaline extracts) is prepared from ash of plants, animal or mineral products.<sup>2</sup> Plant-derived products are becoming more popular as pharmaceutical treatments, nutraceuticals, and

cosmetics in today's world<sup>3,4</sup>. In both developed and developing countries, herbal medications are widely used in health care. The World Health Organization estimates that the majority of the world's population still uses herbs and other traditional medicines for their basic health care requirements.<sup>5</sup> Herbal medicine use has risen dramatically in recent years, in accordance with a global trend of consumers reverting to natural therapies.<sup>6</sup> In the ancient science of *Ayurveda* a variety of herbs are used in the treatments. *Kshara* is an example of such a form. *Kshara* are alkaline chemicals made from herbal medication ashes that are water soluble. In *Ayurveda*, several *Kshara* have been explained, and *Palasha Kshara* (alkali extract of *Butea monosperma* Lam.) is one of them. There are differing viewpoints on vessel specifications, water proportions, settling time, cloth folding, and other factors. In the *Sushruta Samhita*,<sup>7</sup> *Sharnghadhara Samhita*,<sup>8</sup> *Rasa Tarangini*,<sup>9</sup> *Dravyaguna Vigyana*<sup>10</sup> and *Ayurveda Sara Samgraha*,<sup>11</sup> the procedure of preparing *Kshara* is clearly explained. However, there is no reference repetition of washings of ash in any of the classical text. In light of this, repeated washings of the ashes were undertaken in order to prepare *Kshara* and produce a preliminary physicochemical profile of *Palasha Kshara*.

In compendia, it is advocated to prepare *Kshara* from the combination of all parts of plant however the proration of weight of parts of plant has not been mentioned in compendia; hence to standardize the *Kshara Kalpana*, an attempt is made to take equal quantity of ashes obtained from the parts of *Palasha* plant. The plant *Palasha* (*Butea monosperma* Lam.) is native to India and is found throughout the country. *Palasaha* tree is also known as “flame of the forest” because of its reddish orange coloured flowers. It is a medicinal tree and its different parts are used to cure various clinical disorders. It is classified in *Sushruta Samhita* in *Rodhradi*, *Mushkakadi*, *Ambashthadi* and *Nyagrodadhi Gana*. The known pharmacological activities of *Palasha* are that it is anthelmintic, antiimplantation, antiovarulatory, abortifacient, antilaprotic, antigout, antiestrogenic, spasmogenic, antifungal, antispasmodic, hypertensive, astringent, alterative, aphrodisiac, antiasthmatic and bactericidal. *Acharya* *Sushruta* has mentioned names of 24 plants for the *Kshara* preparation. The plant *Palasha* (*Butea monosperma* Lam.) is one among them. And in compendia *Palasha* is referred as “*Kshara Shretha*” i.e. best of all alkalis<sup>12,13</sup>.

It is noticeable that not all the parts of *Palasha* plant are available at a time. The flowers and fruits of *Palasha* plant can be cultivated only in their blooming seasons, where as the roots, stems and leaves of *Palasha* Plants are available throughout the year. Hence to overcome this limitation, this is an attempt to prepare *Palasha Kshara* in two combinations; one is the classical preparation of *Palasha Kshara* using *Palasha Panchanga* (combining ashes obtained from all five parts of Plant *Palasha*) and the another *Palasha Kshara* prepared from the combination of ashes of roots, stems and leaves of Plant *Palasha*. Comparative pharmaceuticals and analytical study of both types *Palasha Kshara* have been done to verify the significance of classical and contemporary method of preparation with respect to the combination of ingredients.

#### **Aim:**

Pharmaceutical and analytical standardization of *Palasha Kshara* prepared by two different combinations.

#### **Objectives:**

1. To prepare *Palasha Kshara* of combination of all five parts of *Palasha* namely roots, stems, leaves, flowers and fruits (*Palasha Panchanga*) that is PK-1
2. To prepare *Palasha Kshara* of combination of parts of *Palasha* which are available throughout the year namely roots, stems and leaves that is PK-2
3. To develop Standard Operating Procedure (SOP) and analytical profile of both the combinations of *Palasha Kshara* PK-1 and PK-2.

4. To evaluate both *Palasha Kshara* PK-1 and PK-2 analytically.

## Materials & Methods

### A. Pharmaceutical study

In this part of study, two combinations of *Palasha Kshara* were prepared from all five parts of *Palasha (Panchanga)* and three parts of *Palasha* plant namely roots stems and leaves by following general method of preparation mentioned in *Rasa Tarangini* (14/59-61). Descriptions pertaining to the manufacturing of the trial drugs along with packaging etc are the integral part of this section.

#### i. Collection & Authentication of parts of *Palasha (Panchanga)*

Fresh and matured parts of *Palasha (Buta monosperma Lam.)* were collected during March 2020 to May 2020. Authentications of parts of *Palasha* plant were done at Foundation of Revitalization of Local Health Tradition Centre for Conservation of Natural Resources FRLHT, Bangalore, Karnataka.

#### ii. Drying of *Palasha Panchanga*

All fresh and mature parts of *Palasha* were cleaned to remove physical impurities, cut in small pieces and weighed individually then subjected to dry in shade. All dried parts of *Palasha* plant were weighed and stored in clean moisture free containers.

#### iii. Preparation of Ash

The dried parts of *Palasha* plant were burnt individually to ashes in clean iron pans of size 36 X 24 X 4 inch. After cooling of burnt material, the ashes of all parts of *Palasha* plant were collected, weighed and stored in separate plastic containers and labelled according to the respective part of *Palasha* plant.

#### iv. Preparation of Combinations of Ashes

Two types of combinations of ashes were made to prepare two types of *Palasha Kshara* namely PK-1 and PK-2 in three batches.

**Combination-1 For PK-1:** This combination contains the ashes of all five parts of *Palasha* plant namely roots, stems, leaves, flowers and fruits in equal weight.

**Combination-2 For PK-2:** The other combination contains the ashes of three parts of *Palasha* Plant namely roots, stems and leaves in equal weight.

#### v. Preparation of *Palasha Ksharajala*

Each combination of *Palasha* ash was taken in a steel vessel with four times the amount of distilled water (w/v). The mixture was thoroughly mashed with a stirrer before being left undisturbed for 24 hours. The clear supernatant liquid (*Palasha Ksharajala*) was collected from the container by using an enema syringe through the outlet after 24 hours. The remaining solution was filtered with muslin cloth. The drained liquid was filtered through filter paper. For second wash the residual ash was again added with 4 times of distilled water, macerated well with hands and kept undisturbed for three hours. The clean supernatant liquid was drained and filtered through filter paper and measured. Same procedure was repeated for third wash. The *Palasha Ksharajala* (PKJ-1 and PKJ-2) obtained during the process of all three washes were measured and noted using a volumetric glass cylinder. Same procedure was repeated for all three batches of combinations of Ashes. To obtain *Kshara*, each of the three washes' *Ksharajala* was independently heated to evaporate the water content. Three batches of *Ksharajala* were made in this manner.

#### vi. Preparation of *Palasha Kshara*

*Palasha Kshara* has been prepared by following classical methods mentioned in *Rasa Tarangini*<sup>14</sup>. All the three filtrates (*Palasha Ksharajala*) were individually subjected to heat to evaporate the water content and to obtain *Palasha Kshara* PK-1 and PK-2. Both *Palasha Kshara* were prepared in three batches. In each batch the *Palasha Ksharajala* was put in a inert stainless steel vessel of average size according to the volume of *Ksharajala* and heated

on a gas stove on mild to moderate heat until the water was completely evaporated and the final yield *Palasha Kshara* (PK-1 and PK-2) have been prepared. The yield of PK-1 and PK-2 were packed and labelled in air tight glass containers.

## B. Analytical Study

The parameters employed to analyze the process, and the final products of both the *Kshara* are as follows:

### i. Organoleptic characters:<sup>15, 16</sup>

The parameters for organoleptic characters are colour, taste, and odour of the samples. These characteristics are beneficial to both the patient and the physician in terms of gaining a basic understanding of the quality of various formulations without the use of chemical tests.

### ii. Physicochemical Parameters:<sup>17</sup>

To define criteria for the repeatability of trial medications, certain parameters are essential. The samples were analyzed for different physico-chemical parameters. The physicochemical factors such as loss on drying at 110°C,<sup>18</sup> Total ash value,<sup>19</sup> Acid insoluble ash,<sup>20</sup> pH value,<sup>21</sup> Alcohol soluble extractives and Water soluble extractives<sup>22</sup> were carried out at Wardha, Maharashtra's Dattatraya Rasashala, Datta Meghe Institute of Medical Sciences.

### iii. Sophisticated Instrumental Techniques:

These are the advanced techniques which distinguish the characteristics of medicines to identify their nature and properties which help in standardization of them.

#### a) Inductively Coupled Plasma with Atomic Emission Spectroscopy:<sup>23</sup>

ICP-AES (inductively coupled plasma atomic emission spectroscopy) is a typical technique for elemental analysis that may be used for both standardization and developing an analytical profile. All samples of the trial medication were evaluated for ten elements using this method. This technique was used to analyze all samples of experimental drugs at SAIF, IIT, Bombay, for ten elements.

#### b) X-Ray Powder Diffraction / Crystallography:<sup>24, 25</sup>

X-Ray powder diffraction (XRD) is a tool used for determining the atomic and molecular structure of a crystal, in which the crystalline atoms cause a beam of incident X-ray to diffract into much specific direction. XRD is a quick analytical technique that can offer information on unit cell dimensions and is mostly used for phase identification of crystalline materials. This technique is used to detect diffraction peaks that correspond to different d-spacing and 2 theta locations, which are material properties. In this present study XRD of two samples of PK-1 and PK-2 were done and analyzed at Sophisticated Instrumentation Centre for Applied Research & Testing (SICART), Gujrat.

## Observations and Results:

**Table 1: Observations and result obtained during collection, drying and burning of Parts of *Palasha* plant**

S No.	Name of part of plant <i>Palasha</i>	Weight of Fresh Form (Kg)	Weight of Dried form (Kg)	% yield of dried parts of <i>Palasha</i> w/w	Weight of Ash of <i>Panchanga</i> (Kg)	% of Ash obtained from the Fresh form of the <i>Parts of Palasha Plant</i>	% of Ash obtained from the dried form of the <i>Parts of Palasha Plant</i>
1	Roots	63.066	28.956	45.367	2.240	3.551	7.855
2	Stems	61.674	32.736	53.079	2.402	3.894	7.580

3	Leaves	18.544	9.632	51.923	1.280	6.902	13.288
4	Flowers	24.400	10.567	43.308	0.819	3.356	7.75
5	Fruits	31.210	5.142	16.476	0.594	1.9032	11.550

**Table 2 : Observations and result obtained during preparation of *Palasha Ksharajala* of both Combinations (PKJ-1 and PKJ-2)**

Wash	Average Weight of ash (g)	Volume of Distilled Water (ml)	Average Yield of <i>Ksharajala</i> (ml)	Average percentage yield of <i>Ksharajala</i> (%)
<b>Average <i>Palasha Ksharajala</i> prepared from 3 batches of combination-1 (PKJ-1)</b>				
<b>I</b>	700 g	2800 ml	2044 ml	73 %
<b>II</b>	Residue*	2800 ml	2072 ml	74 %
<b>III</b>	Residue*	2800 ml	2084 ml	74.44 %
<b>Average <i>Palasha Ksharajala</i> prepared from 3 batches of combination-2 (PKJ-2)</b>				
<b>I</b>	300 g	1200 ml	944 ml	79.67 %
<b>II</b>	Residue*	1200 ml	996 ml	83 %
<b>III</b>	Residue*	1200 ml	1012 ml	84.34 %

Residue\*= Weight of the ash left as residue after filtration was not taken.

**Table 3 : Average % yield of *Palasha Kshara* from Consecutive 3 washes**

S. No.	Name of <i>Palasha Kshara</i>	Average % yield of <i>Palasha Kshara</i> obtained from I-wash	Average % yield of <i>Palasha Kshara</i> obtained from II--wash	Average % yield of <i>Palasha Kshara</i> obtained from III--wash
1	<b>PK-1 (Panchanga)</b>	15.95	3.83	0.98
2	<b>PK-2 (RSL)</b>	3.604	0.475	NA

NA= Not Available as the yield was very negligible to weigh

**Table 4 : Results obtained during Pharmaceutical processing of *Palasha Kshara*:**

S. No.	Name of <i>Palasha Kshara</i>	Total weight of ash used in 3 batches (g)	Total weight of yield <i>Palasha Kshara</i> in 3 batches (g)	Total % yield of <i>Palasha Kshara</i>
1	<b>PK-1 (Panchanga)</b>	2100 g	435.914 g	20.757 %
2	<b>PK-2 (RSL)</b>	900 g	36.687 g	4.067 %

**Table 5 : Organoleptic characters and Physico-chemical parameters of Raw material (Dried form of parts of plant *Palasha* )**

Parameter	Roots	Stems	Leaves	Flowers	fruits
<b>Colour</b>	Dark Brown	Dark Brown	Bright Green	Orange	Light Green

<b>Taste</b>	Characteri stic	Characte ristic	Characte ristic	Characteri stic	Charact eristic
<b>Odour</b>	Characteri stic	Characte ristic	Characte ristic	Characteri stic	Charact eristic
<b>Touch</b>	Rough	Rough	Smooth	Smooth	Smooth, hairy
<b>Foreign matter %</b>	0.45	Nil	Nil	Nil	Nil
<b>Loss on drying at 105°C (%w/w)</b>	2.1	0.98	0.87	1.2	1.90
<b>Total Ash value (%w/w)</b>	4.2	3.9	3.7	3.7	4.1
<b>Water soluble extractive value</b>	17.33	11.93	9.73	18.16	7.39
<b>Alcohol soluble extractive value</b>	11.82	7.66	11.20	13.39	5.32
<b>pH (10% aqueous extract)</b>	6.59	5.96	7.2	6.1	4.6

### Finished Drug Analysis

**Table 6: Comperative Organoleptic Characters and Physico-chemical parameters of Palasha Kshara**

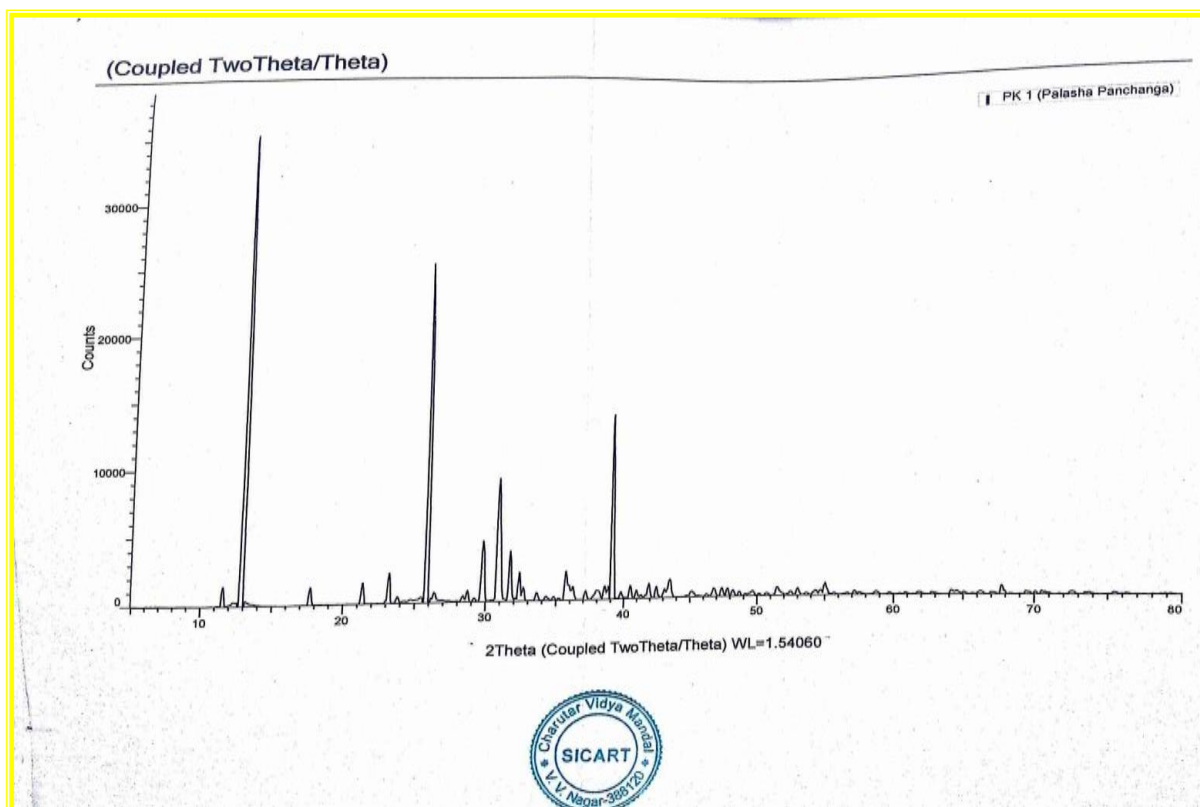
<b>Parameter</b>	<b>PK-1</b>	<b>PK-2</b>
<b>Appearance</b>	Fine powder	Fine powder
<b>Colour</b>	Peach	Light peach
<b>Taste</b>	Salty	Salty
<b>Odour</b>	Characteristic/ Soapy	Characteristic/ Soapy
<b>Loss on drying at 105°C (%w/w)</b>	6.9	1.9
<b>Total Ash value (%w/w)</b>	85.8	94.2
<b>Acid insoluble ash (%w/w)</b>	17.2	7.5
<b>Water soluble extractive value</b>	28.4	27.9
<b>Alcohol soluble extractive value</b>	1.8	2.8
<b>pH (10% aqueous extract)</b>	10.44	10.47

**Table 7: Results of ICP-AES analysis of samples of PK-1 & PK-2**

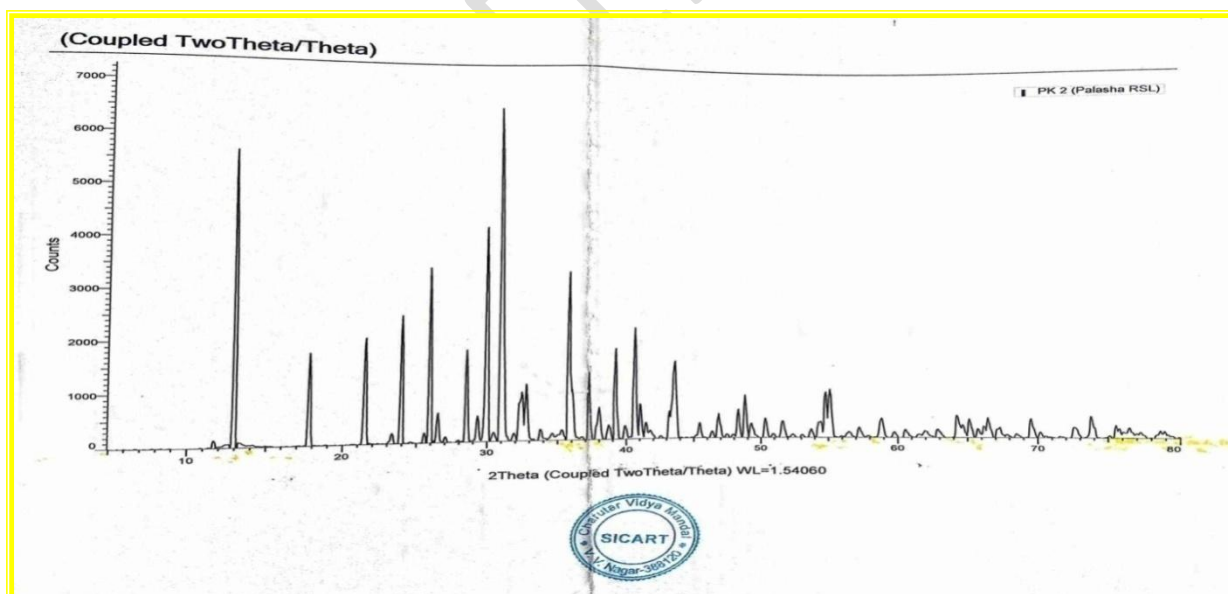
<b>S. No.</b>	<b>Element</b>	<b>Symbol</b>	<b>PK-1</b>	<b>PK-2</b>
1	Mercury	Hg	0.0068 %	ND
2	Arsenic	As	0.0091 %	0.00019 %
3	Cadmium	Cd	ND	ND
4	Lead	Pb	0.00039 %	0.00057 %
5	Calcium	Ca	0.065 %	0.045 %
6	Iron	Fe	0.0049 %	0.0123 %
7	Potassium	K	41.65 %	47.51 %
8	Magnesium	Mg	0.011 %	0.0067 %
9	Sodium	Na	0.169 %	1.207 %
10	Silica	Si	0.166 %	0.711 %

Note : ND means less than 0.01PPM

**Graph Diagram 1: X-Ray diffraction (XRD) of test Drug *Palasha Kshara* PK-1**



**Graph Diagram 2: X-Ray diffraction (XRD) of test Drug *Palasha Kshara* PK-2**



Since the parts of plant *Palasha* was entirely dry, it burned rapidly and readily. Roots and stems, on the other hand, took longer to burn while the leaves burnt in least time followed by fruits and flowers. After drying of Parts of *Palasha* the respective weight was reduced to nearly half of their weight of fresh parts. There were significant fewer yields after drying of fruits of *Palasha* (16.476%) [Table 1]. The colour of the ashes obtained after burning the parts of *Palasha* plant individually were in variety of grey colours, somewhat different from one another, with a distinct flavour. Ashes of flowers and fruits were dark

blackish gray while those of others were light gray in colour. *Ksharajala* preparation took a total of 4 hours for a single wash. After consecutive washing of ashes, the average yield of *Ksharajala* were increasing. [Table 2]. During evaporation of the *Ksharajala*, it transformed to light brownish semisolid mass with aggregation and cracking sounds. The consecutive yield of *Palasha Kshara* after every wash were decreasing drastically because the decrease in water soluble element in *Ksharajala* after each wash [Table 3]. The both *Palasha Kshara* obtained were tasted salty, both had a distinct flavour, and were orange and yellowish light orange in colour [Table 6]. The sediments left over after the first wash should not be discarded and should be washed again. And the obtained *Ksharajala* were evaporated to get more *Kshara*. The subsequent washings were repeated till significant *Kshara* was obtained. The sediments were discarded after the third wash. Table 8 shows the ICPAES results and both graph diagrams 1 and 2 represent the crystalline structure and amount of functional groups in them. The numbers of prominent peak in sample PK-1 is 6 with along many small peaks and the numbers of prominent peak in sample PK-2 is 18 with along many small peaks with comparatively more smaller peaks than PK-1. It indicates the presence of more functional groups in the sample of PK-2 than PK-1. The nature peaks are observed sharp and thin elongated in both the samples. The sharpness of samples indicates the crystalline nature of both the samples. The observed crystallinity of PK-1 is more (87.5%) than PK-2 (84.6%).

### Discussion:

The preparation of both combinations of *Palasha Kshara* PK-1 and PK-2 in this study were done according to instructions mentioned in *Rasa Tarangini*<sup>26</sup>. To speed up the drying process, cut dried parts of *Palasha* plant into small pieces. To avoid contamination during the burning process, the dried parts of plant should be burned in separate iron pan. The dried parts should be put into the fire in small amounts to ensure efficient burning and small portion of dried parts should be added after burning of the previous one. For *Palasha Ksharajala* preparation, the ash and water were taken by weight and volume respectively. To eliminate any impact from inorganic salts in tap water, distilled water was used. To avoid chemical reactions, stainless steel or glass containers were utilized.

For optimum mixing, the ash should be thoroughly stirred with stirrer and rubbed with hands in water and let to settle for at least 3 hours. *Ksharajala* must be retrieved through the outlet with enema syringe with extreme caution, so as not to let mixing of settled down ash with *Ksharajala*. To avoid precipitate in the filtrate, *Acharyas* also recommended filtering the contents over a multifold cloth. *Ksharajala* was a transparent yellowish liquid. Temperature increased the amount of aggregation, fumes, and crackling sounds. As the temperature rose, the colour changed from yellowish to brownish. In the later phases, *Kshara* began to attach to the vessel, and bumping was seen. At this point, it was gently swirled to avoid bumping and sticking. Finally, light orange colored and Peach colored *Palasha Kshara* PK-1 and PK-2 were got respectively. The *Ksharajala* of PKJ-1 took less time than PKJ-2. This might be because of more percentage of *Kshara* present in PKJ-1.

*Kshara* is a water soluble ash, however it is impossible to extract all of the water soluble material in a single wash; some of it may be left behind as residue. In light of this, three washes were completed in order to obtain the highest output. The first wash of PK-1 and PK-2 yielded 15.95% and 3.604 % of *Kshara* respectively which was maxim in all washes [Table 3], whereas after the third wash the total yield was 20.757% and 4.067% respectively [Table 4]. The *Kshara* got added after each wash is a considerable value to get out of them. In compared to commercially available pharmacy methods, the new procedure is better and yields more.

The organoleptic characters of raw materials indicated their natural appearance, color, taste and odour. The pH values of parts of *Palasha* plant were from range 4.6 (Fruits) to

7.2 (Leaves) which indicated that the raw materials were mild acidic to neutral in nature [Table 5].

The organoleptic characters of the research drug *Palasha Kshara* PK-1 and PK-2 indicated that they were slimy in touch, peach in colour, salty in taste, distinctive odour, and fine powder in appearance. During storage, the material accumulates moisture which indicates their hygroscopic nature. Moisture, in combination with an appropriate temperature, will activate enzymes and provide ideal conditions for the multiplication of living organisms. As a result, the amount of moisture in the drug may have an impact on its quality. Although water is the primary cause of weight loss in the samples, a minor amount of other volatile components will also contribute to weight loss. Hence the final drug should be packed in air tight inert containers. [Table 6].

Total ash value is crucial since it reveals how well the medicine was prepared to some extent. Because alkali chlorides, which are volatile at high temperatures, would otherwise be lost, the carbon must be removed at as low a temperature as feasible (450°C) for determining total ash value. The degree of acidity or alkalinity of a sample solution is expressed by the pH value of the samples PK-1 and PK-2 are found 10.44 and 10.47 respectively. [Table 6] The alkalinity of a medicine tells where it is absorbed and acts. *Ayurvedic* medicine analysis indicates a lot about their elemental composition.

The samples PK-1 and PK-2 were analysed using ICP-AES revealed that, Potassium, Sodium, silica, Calcium and Magnesium are the main constituent of both *Kshara*. This might be because of that the plant *Palasha* grows in soil by absorbing nutrients from the soil. And soil is a rich source of metals and minerals. Heavy metals such as arsenic, lead, mercury, and cadmium were not detected or were found to be within acceptable ranges. Silica and iron were found in the area. Both PK-1 and PK-2 yielded the same results. The concentration of potassium is more in PK-2 (47.51%) than PK-1 (41.65%) [Table 7].

The XRD study reveals presence of more functional groups in PK-2 than PK-1. Both samples are found crystalline in nature. The observed crystallinity of PK-1 is more (87.5%) than PK-2 (84.6%)[Graph Diagram 1 & 2]. Although sample PK-1 is prepared from the combinations of all five parts of *Palasha* plant in equal proportion of their ashes whereas sample PK-2 is prepared from the combinations of three parts of *Palasha* plant in equal proportion of their ashes. It indicates that ashes of roots, stems and leaves possess more number of functional groups. And this represents that sample PK-2 may be more active than PK-1. There is need of further study to elaborate the role of functional groups present in both samples of *Palasha Kshara*.

The *Acharya* had deep insight regarding taking of *Panchanga* for *Kshara* preparation. From the present study it is clear that although both combinations of *Palasha Kshara* PK-1 and PK-2 have significant therapeutic values [Table 6], but the yield of PK-2 is almost five times less than the yield of PK-1. Although the combination of parts of *Palasha* plant ( roots, stems and leaves) to prepare PK-2 are available throughout the year and to prepare PK-1 one has to wait for flowering and fruiting seasons of *Palasha* plant to collect them, still it is not cost effective to get an average yield of PK-2 up to 4.06%. and as shelf life of *Palasha Kshara* can be increased by triturating it with *Palasha Ksharajala*<sup>27</sup> ( A.H.Su. 30/23). Hence it can be prepared in the in flowering and fruiting seasons of *Palasha* and can be stored for years together. The *Palasha Kshara* is hygroscopic in nature so, it should be stored in air tight glass container to prevent atmospheric reactions with it. Few of the studies on standardization of ayurvedic preparations were reviewed<sup>28-32</sup>.

The whole processing should be done with precautions as *Palasha Ksharajala* and *Palasha Kshara* are found alkaline and corrosive in nature. Face shield and hand gloves should be wore while handling *Palasha Ksharajala* and *Palasha Kshara* as they may cause mild irritation to skin. In case of irritation, the site should be immediately washed off with water and *Ghrita* can be applied on skin to nullify the corrosive effect of *Palasha Ksharajala* and *Palasha Kshara*.

### Conclusion:

After the initial wash, the remnants should never be thrown away; they should be processed twice more to generate more *Palasha Kshara*. A maximum yield of 20.757% and 4.067% were obtained after three washing. The analytical studies suggested that both *Palasha Kshara* are alkaline in nature which can be used for their therapeutic values. The ICP-AES study suggest maximum presence of potassium element percentage in both *Palasha Kshara* and heavy metals such as arsenic, lead, mercury, and cadmium were not detected or were found to be within acceptable ranges, which make both *Kshara* acceptable for their therapeutic uses. The XRD study revealed that the crystallinity of PK-1 is more than PK-2 and there was presence of more functional groups in PK-2 than PK-1. The current findings may serve as a starting point for further research. The use of enema syringe for decantation of supernatant liquid, and use of filter paper for filtration of *Palasha Ksharajala* can be practiced now after to save time instead of the classical method of filtration with folded cloth to get clear *Ksharajala*.

**Fig.1:Pharmaceutical processing of *Palasha Kshara***



**Dring of *Palasha* Parts**



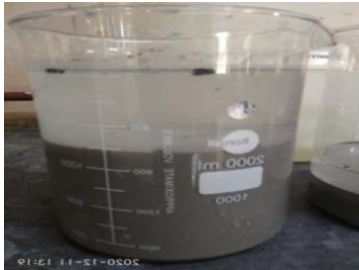
**Burning Of Dried Parts**



**Collection Of Ash**



**Soaking of ash in Distilled Water**



**Decantation of *Ksharajala***



**Filtration of *Khasrajala***



UNDER PEER REVIEW

**Fig. 2: Analytical processing of *Palasha Kshara***



## NOTE:

The study highlights the efficacy of "Ayurvedic" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable

## References

1. Sharma S, Rasa Tarangini, Hindi commentary by Shastri Kashinatha, 11th Ed. Delhi, Motilal Banarasidas, 1989,11/34, pp. 583.
2. Vagbhata, Astanga Hridaya, English Translation by Murthy KRS(Editor), 7th Ed. Varanasi, Chowkhamba Krishnadas Academy, 2010, Sutra Sthana 30/ 8-12, pp. 344-45.
3. Bhanu PS, Zafar R, Panwar R. Herbal drug standardization. Indian Pharm 2005;4:19-22.
4. Gautam V, Raman RM, Ashish K. Exporting Indian Healthcare (Export potential of Ayurveda and Siddha Products and Services). Road Beyond Boundaries (The Case of Selected Indian Healthcare Systems). Export-import Bank of India. Mumbai; 2003. p. 14-54.
5. WHO. Int. World Health Organization, WHO; 2012. Available from: [http://www.who.int/mediacentre/factsheets/2003/fs134/en/](http://www.who.int/mediacentre/factsheets/fs134/en/) Last accessed on: 09-06-2015.
6. Vaidya AD, Devasagayam TP. Current status of herbal drugs in India: An overview. J Clin Biochem Nutr 2007;41:1-11.
7. Ambikadatta S, editor. Susruta Samhita of Maharsi Susruta, Sutra Sthana; *Ksharapaka Vidhi*. Ch. 11, Ver. 13. Varanasi: Chaukhamba Sankrita Sansthan; 2010. p. 47-8.
8. Vidhyasagar PS, editor. Sharangadhara Samhita of Sharangadhara, Madhyama Khand. 1st ed., Ch. 11, Ver. 101-104. Varanasi: Choukhamba Surbharti Praka; 2006. p. 256.
9. Shastri K, editor. Rasa Tarangini of Sadanada Sharma, Taranga 14. 11th ed., Ver. 59-61. New Delhi: Motilala Banarsidas; 2004. p. 337.
10. Anonymous. Dravyaguna Vigyana of Yadavji Trikamji Acharya, Uttarardh, Adhyaya 2. 6th ed., Ver. 102-104. Nagpur: Shree Baidhyanath Ayurveda Bhavan Li; 2013.p. 61.
11. Anonymous. Ayurved Sar Samgraha, *Kshara-lavan-satva Prakarana*. Alahabad: Shree Baidhyanath Ayurveda Bhavan Li; 2013. p. 697.
12. Acharya Priyavat Sharma, Dr Guruprasad Sharma, Kaiyadeva Nighantu (Pathya-Apathya Vibhodaka), Chaukhamba Orientalia, Varanasi, 2nd edition, 2006; pg no 155.
13. Shri Bhavmishra, commentary by Dr K C Chunekar, edited by Dr G S Pandey, BhavprakashNighantu, Vatadivarga 49-50, ChaukhambaBharati Academy, 2006 edition, pg no 535-536.
14. Shastri K, editor. Rasa Tarangini of Sadanada Sharma, Taranga 14. 11th ed., Ver. 59-61. New Delhi: Motilala Banarsidas; 2004. p. 337.
15. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 42nd ed. Pune: NiraliPrakashan; 2008. P63.
16. Anonymous Ayurvedic Pharmacopoeia of India, part-2, vol-2, Appendices. 1sted. NeDelhi: Govt of India, Ministry of Health of family Welfare; 2008.p.15-7. a) Anonymous (1999), The Ayurvedic Pharmacopoeia of India, edition 1st, Govt. Of

- 
- India, Ministry of Health and Family welfare, Department of I.S.M. & H., New Delhi, Part –I, Volume -I
17. William H., (1960), Official Method of Analysis, Association of Official Agricultural chemists, Washington, P: 185.
  18. The Ayurvedic Pharmacopoeia of India, 1st ed, Part II, Vol. I, Appendix-2, (2.2.10) Pg. 141.
  19. The Ayurvedic Pharmacopoeia of India, 1st ed, Part II, Vol. I, Appendix-2, (2.2.3) Pg. 140.
  20. The Ayurvedic Pharmacopoeia of India, 1st ed, Part II, Vol. I, Appendix-2, (2.2.3) Pg. 140.
  21. The Ayurvedic Pharmacopoeia of India, 1st ed, Part II, Vol. I, Appendix-3, (3.3), Pg. 191.
  22. Anonymous. The Ayurvedic Pharmacopoeia of India, Part II. 1st ed., Vol. I. Delhi: Govt. of India, Ministry of Health and Family Welfare, Department of AYUSH; 2007. p. 141.
  23. <http://www.rsic.iitb.ac.in/Icp-Aes.html>
  24. En.wikipedia.org/wiki/X-Ray\_crystallography retrived at 23/3/2014
  25. [http://www.icdd.com/resources/axa/VOL46/V46\\_08.pdf](http://www.icdd.com/resources/axa/VOL46/V46_08.pdf)
  26. Shastri K, editor. Rasa Tarangini of Sadanada Sharma, Taranga 14. 11th ed., Ver. 59-61. New Delhi: Motilala Banarsidas; 2004. p. 337.
  27. Vagbhata, Astanga Hrdaya, English Translation by Murthy KRS(Editor), 7th Ed. Varanasi, Chowkhamba Krishnadas Academy, 2010, Sutra Sthana 30/ 23, pp. 346-347.
  28. Madan P, Rathi B, Rathi R, Wairagade S, Zade D. Pharmaceutical Development, Standardization and Clinical Evaluation of Efficacy of a Polyherbal Hair-Pack and Hair Gel in Dandruff Control. JOURNAL OF PHARMACEUTICAL RESEARCH INTERNATIONAL. 2021;33(31B):69–78.
  29. Satpute M, Rathi B, Wanjari A, Khan M. Comparative Pharmaceutical Standardization and Oral Bioavailability Study on Praval Pishti and Praval Bhasma. JOURNAL OF PHARMACEUTICAL RESEARCH INTERNATIONAL. 2021;33(31B):54–60.
  30. Deogade, Meena Shamrao, and K. S. R. Prasad. “Standardization of Wild Krushnatulasi (Ocimum Tenuiflorum Linn) Leaf.” INTERNATIONAL JOURNAL OF AYURVEDIC MEDICINE 10, no. 1 (March 2019): 52–61.
  31. Agrawal A, Timothy J, Cincu R, Agarwal T, Waghmare LB. Bradycardia in neurosurgery. Clinical neurology and neurosurgery. 2008 Apr 1;110(4):321-7.
  32. Nagrale AV, Herd CR, Ganvir S, Ramteke G. Cyriax physiotherapy versus phonophoresis with supervised exercise in subjects with lateral epicondylalgia: a randomized clinical trial. Journal of Manual & Manipulative Therapy. 2009 Jul 1;17(3):171-8.