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# Rasapanchakas Assessment of Seeds of a Folk Plant - *Gnetum ula* Brongn.

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## ABSTRACT

**Background:** Ayurveda opines that every plant has its own medicinal values, but there are many less explored plants which are not popular though beneficial either as food or as medicine. But this knowledge is passed from tradition to tradition in folklore practices but within a few groups of a society. One such plant from gymnosperm group is *Gnetum ula* Brongn. (Gnetaceae) found commonly in and around Udupi. Locally known as *kumti beja*. Seeds are roasted or boiled and consumed as it is said to be very nutritious and having *krimighna* action by folk practitioners. The present work aimed in such less explored plants for its assessment of *Rasapanchakas*. **Methods:** The study conducted was to assess the *rasapanchakas* of seeds of *G.ula* in which *Rasa* was assessed by healthy volunteers of sample size 10 and giving scores. Assessment of *guna*, and *vipaka* at the level of *dosha*, *dhatu* and *mala* by using animal model and by the experience documented by the folk lore practioners. Assessment of *virya* by exothermic, endothermic reactions in distilled water. **Results:** Study revealed seeds of *G. ula* having, *kashaya* as *pradhana rasa*, *anurasa* is *madhura -tikta*, *guna* is *guru*, *ruksha* and *ushna*. *Virya* is *ushna* and *vipaka* is *katu*. **Conclusion:** Folklore medicine has tremendous source of information regarding the utility of locally available plants for both as food and as medicines. Such plants have to be properly explored and scientifically documented before putting it into use.

**KEYWORDS** *Kumti beja*, *Gnetum ula*., *Rasapanchakas*, *Rasa*, *Guna*, *Virya*, *Vipaka*.

## PICTORIAL ABSTRACT



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## 1. INTRODUCTION

Human's passion for herbal medicine dates back to Vedic period. The usage of these plants either for food or for medicine was going on since ages. Among them some of them were documented in our classics which describes locally available and often readily accessible sources in the form of *aahara* and *aushadha*.<sup>[1]</sup> The usage of *G. ula* seeds by folklore people for edible purposes as per the information documented from Folklore Medicine Research Centre Shree Dharmasthala Manjunatheshwara College of Ayurveda, Udupi. It suggests about the usage of roasted seeds for edible purpose and the seed oil in ailments like Rheumatism.<sup>[2,3]</sup> The kingdom

plantae are divided into mainly 2 groups Angiosperms and Gymnosperms. Unlike angiosperms, Gymnosperms are an ancient group of plants, they are naked seeded plants (*gymnos*-naked; *sperma*-seed), those in which the seeds are not enclosed within the fruit but are directly borne by the open carpel called megasporophyll (i.e., not enclosed to form the ovary, as in angiosperms). They form an intermediate group between cryptogams and the angiosperms, being related to the higher forms of cryptogams on the one hand and to the lower angiosperms on the other.<sup>[4]</sup> In the family Gnetaceae, the sole genus *Gnetum* which includes many species of woody trees, shrubs or even climbers.<sup>[5]</sup> And in India, *Gnetum* is represented by 5 species.<sup>[6]</sup>

Science which deals with *Dravya*, *Guna* and *Karma* of substances that promote longevity and unfavourable substances that hamper longevity may be termed as *Dravyaguna shastra*.<sup>[7]</sup> Today the branch *Dravyaguna* is a comprehensive discipline which embraces various aspects of drugs like animal and plant origin, identification, collection, physical and chemical properties, it evaluates the drugs on the basis of their mode of an action, their compatibility, their therapeutic efficacy and toxic effects, if any. Therefore, a scholar of *Dravyaguna* has to be an interdisciplinary.

## 2. MATERIALS AND METHODS

### 2.1 Assessment of *Rasa*<sup>[8]</sup>

*Rasa* not only perception of taste but is an indicator of the composition, properties and probable drug action of a *Dravya*. And tongue is the subject of criteria for determining the *rasa* or *anurasa* of a drug. The following method for assessment of *rasa* with tongue was adopted. Healthy volunteers, preferably Ayurvedic students, who may not make mistakes in expressing the *rasa* they perceive, were selected. They were asked to wash their mouth and five minutes gap was allowed between washing of mouth and tasting of drug. Taste determination of different formulations like *kashayam* of roasted seed powder, boiled seeds, *kashaya* of seeds of *G. ula* was given to these volunteers, chits of paper were given to them and requested to record the *rasa* and *anurasa* they perceive. The method adopted was blind method, in which volunteers were not told about the identity of drug. As assessment of *rasa* is not the same pattern, it depends on the individual, so we have planned to elicit by giving scores. With the help of this scoring identification of *rasa* and *anurasa* was done. The test was conducted on a volunteer group of sample size 10, by giving scores as *pradhana rasa* -4, first *anurasa*-2, second *anurasa*-1. The assessment was done using various types of preparations of seeds like fresh, roasted, boiled seeds, fresh and roasted seed *kashayam* of *G. ula*.

### 2.2 Assessment of *Vipaka*

*Vipaka* is the transformed state of ingested substance after digestion. It can be ascertained by the action, which produces in the body. These actions have been described at the level of the *dosha*, *dhatu* and *mala* of the body. The changes in the substance may take place at the level of the *pachakagni*, *bhutagni* and *dhatvagni*.<sup>[8]</sup> Therefore the area of action of *vipaka* extends from the gastrointestinal tract to the *dhatu*s and cannot be restricted to *pachakagni* or G.I tract only. After ingestion into the body through any route, any transformation or simplification by any enzymes or hormone in any part of the body is called *vipaka*. It therefore implies changes in substances during digestion and metabolism. The method that is used in the assessment of *vipaka* at the level of *mala* by the criteria mentioned in the text.<sup>[8]</sup>

### 2.2 Assessment of *Guna*

*Dravyas* act by their *gunas* which inherently reside in them. The assessment of *Guna* is made by considering the physical parameters, the action of the drug after administration in animal model and experience of the local people and folklore practitioners who are using the seeds as *ahaara* and *oushadha*.

### 2.3 Assessment of *Virya*<sup>[8]</sup>

5 ml of distilled water is taken in a test tube and the temperature of the water is noted with the help of industrial thermometer, 5 g of roasted seed powder of *G. ula* was added to the test tube and temperature was noted soon after the addition also after 5,10,15 min time interval and observed for an hour. This procedure is repeated for many times to avoid the human errors.

## 3. OBSERVATION AND RESULT

### 3.1 *Rasa*

#### 3.1.1 Fresh seeds

It was observed from the fresh seed powder of *G. ula*, *kashaya rasa* was noted as *pradhana rasa* by 5 volunteers, 4 volunteers noted as first *anurasa* and 1 volunteer as second *anurasa*. *Madhura rasa* was noted as *pradhana rasa* by 4 volunteers, 2 volunteers as first *anurasa* and 1 volunteer as second *anurasa*. *Tikta rasa* was noted as *pradhana rasa* by 1 volunteer, first *anurasa* by 2 volunteers and second *anurasa* by 3 volunteers.

By seeing the total scores of fresh seeds of *G. ula*, *Kashaya* is *Pradhana rasa*, *Anurasa* is *Madhura*, *Tikta* (Table 1).

#### 3.1.2 Roasted seeds

It was observed from the roasted seed powder of *G. ula*, *Tikta rasa* was noted as *pradhana rasa* by 5 volunteers, 4 volunteers noted as first *anurasa* and 1 volunteer as second *anurasa*. *Madhura rasa* was noted as *pradhana rasa* by 2 volunteers, 4 volunteers noted as first *anurasa* and no volunteers noted 2 *anurasa*. *Kashaya rasa* was noted as *pradhana rasa* by 3 volunteers, first *anurasa* by 1 volunteer and no volunteer noted as second *anurasa*.

By seeing the total scores of roasted seed powder of *G. ula*, *Tikta* is *Pradhana rasa*, *Anurasa* is *madhura* and *Kashaya* (Table 2).

#### 3.1.3 Boiled seeds

It was observed from the boiled seeds powder of *G. ula*, *kashaya rasa* was noted as *pradhana rasa* by 5 volunteers, 3 volunteers noted as first *anurasa* and 1 volunteer as second *anurasa*. *Madhura rasa* was noted as *pradhana rasa* by 5 volunteers, 3 volunteers noted as first *anurasa* and 1 volunteer noted as second *anurasa*. *Tikta rasa* was noted as *pradhana rasa* by 1 volunteer, first *anurasa* by 2 volunteers and 5 volunteers noted as second *anurasa*. By seeing the total scores of boiled

**Table 1: Taste determination of fresh seeds of *G. ula***

Rasa	Pradhana rasa		1 <sup>st</sup> Anurasa		2 <sup>nd</sup> Anurasa		Total Score
	Volunteers	Score	Volunteers	Score	Volunteers	Score	
Kashaya	5	x 4 = 20	4	x 2 = 8	1	x 1 = 1	29
Madhura	4	x 4 = 16	2	x 2 = 4	1	x 1 = 1	21
Tikta	1	x 4 = 4	2	x 4 = 8	3	x 1 = 3	15

**Table 2: Taste determination of roasted seeds of *G. ula***

Rasa	Pradhana rasa		1 <sup>st</sup> Anurasa		2 <sup>nd</sup> Anurasa		Total Score
	Volunteers	Score	Volunteers	Score	Volunteers	Score	
Tikta	5	x 4 = 20	4	x 2 = 8	1	x 1 = 1	29
Madhura	2	x 4 = 8	4	x 2 = 8	0	0	16
Kashaya	3	x 4 = 12	1	x 2 = 2	0	0	14

**Table 3: Taste determination of boiled seeds of *G. ula***

Rasa	Pradhana rasa		1 <sup>st</sup> Anurasa		2 <sup>nd</sup> Anurasa		Total Score
	Volunteers	Score	Volunteers	Score	Volunteers	Score	
Kashaya	5	x 4 = 20	3	x 2 = 6	1	x 1 = 1	27
Madhura	5	x 4 = 20	3	x 2 = 6	1	x 1 = 1	27
Tikta	1	x 4 = 4	2	x 2 = 4	5	x 1 = 5	13

seeds of *G. ula*, *Kashaya*, *Madhura* is *Pradhana rasa*, *Anurasa* is *Tikta* (Table 3).

### 3.1.4 Fresh seed *kashayam*

It was observed from the fresh seed *kashaya* of *G. ula*, *kashaya* *rasa* was noted as *pradhana rasa* by 5 volunteers, 5 volunteers noted as first *anurasa* and no volunteer noted second *anurasa*. *Tikta* *rasa* was noted as *pradhana rasa* by 5 volunteers, 4 volunteers noted as first *anurasa* and no volunteers noted second *anurasa*. *Madhura* *rasa* was not noted by any volunteers as *pradhana* and first *anurasa*. 2 volunteers noted as second *anurasa*. By seeing the total scores of *kashaya* of fresh seeds of *G. ula*, *Pradhana rasa* is *Kashaya*, *Anurasa* is *Tikta*, *Madhura* (Table 4).

### 3.1.5 Roasted seed *kashayam*

It was observed from the roasted seed *kashayam* of *G. ula*, *madhura* *rasa* was noted as *pradhana rasa* by 6 volunteers, 4 volunteers noted as first *anurasa* and no volunteer noted second *anurasa*. *Kashaya* *rasa* was noted as *pradhana rasa* by 2 volunteers, 5 volunteers noted as first *anurasa* and 3 volunteers noted as second *anurasa*. *Tikta* *rasa* was noted as *pradhana rasa* by 2 volunteers and as first *anurasa* by 1volunteers, 3 volunteers noted as second *anurasa*. By seeing the total scores of *Kashayam* of roasted seeds of *G. ula*, *Pradhana rasa* is *Madhura*, *Kashaya* and *Anurasa* is *Tikta* (Table 5).

### 3.1.6 Assessment of *rasa* of seeds according to highest scores

By seeing all the 5 forms and overall assessment of total score of *rasa* and *anurasa* of *G. ula* it can be assessed as, *Pradhana rasa* is *Kashaya*, *Anu* *rasa* is *Madhura*, *Tikta* (Table 6).

### 3.2 Vipaka and Guna

The analysis of *vipaka* and *Guna* of a *Dravya* is assessed by the action of the drug administration in animal model. Absolute and relative values of food consumption, water intake, wet and dry faecal weight of the animal, urine output, food conversion ratio, body weight of the animal is statistically summarised.

#### 3.2.1 Effect of on food consumption with data presented in absolute values

The data related to the effect of *G. ula* seed test formulation on food consumption on the basis of absolute value have been summarized (Table 7).

The data shows there was increase in food consumption in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant. The data shows there was increase in food consumption in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically non-significant.

**Table 4: Taste determination of fresh seed *Kashayam* of *G. ula***

Rasa	Pradhana rasa		1 <sup>st</sup> Anurasa		2 <sup>nd</sup> Anurasa		Total Score
	Volunteers	Score	Volunteers	Score	Volunteers	Score	
<i>Kashaya</i>	5	x 4 = 20	5	x 2 = 10	0	0	30
<i>Tikta</i>	5	x 4 = 20	4	x 2 = 8	0	0	28
<i>Madhura</i>	0	0	1	x 2 = 2	2	x 1 = 2	4

**Table 5: Taste determination of roasted seed *Kashayam* of *G. ula***

Rasa	Pradhana rasa		1 <sup>st</sup> Anurasa		2 <sup>nd</sup> Anurasa		Total Score
	Volunteers	Score	Volunteers	Score	Volunteers	Score	
<i>Madhura</i>	6	x 4 = 24	4	x 2 = 8	0	0	32
<i>Kashaya</i>	2	x 4 = 8	5	x 2 = 10	3	x 1 = 3	21
<i>Tikta</i>	2	x 4 = 8	1	x 2 = 2	3	X 1 = 3	13

**Table 6: *Rasa* and *Anurasa* perceived in different forms of seed of *G. ula***

Rasa	Different forms	<i>Kashaya rasa</i>	<i>Madhura rasa</i>	<i>Tikta rasa</i>
<i>Pradhana rasa</i>	Raw seeds	20	16	4
	Roasted seeds	12	8	20
	Boiled seeds	16	20	4
	<i>Kashaya</i> of fresh seeds	20	0	20
	<i>Kashaya</i> of roasted seeds	8	24	8
1 <sup>st</sup> <i>Anurasa</i>	Raw seeds	8	4	8
	Roasted seeds	2	8	8
	Boiled seeds	10	6	4
	<i>Kashaya</i> of fresh seeds	10	2	8
	<i>Kashaya</i> of roasted seeds	10	8	2
2 <sup>nd</sup> <i>Anurasa</i>	Raw seeds	1	1	3
	Roasted seeds	0	0	1
	Boiled seeds	1	1	5
	<i>Kashaya</i> of fresh seeds	0	2	0
	<i>Kashaya</i> of roasted seeds	3	0	3
	Total	121	100	98

**3.2.2 Effect of on food consumption with data presented in relative values**

The data related to the effect of *G. ula* seed test formulation on Food consumption on the basis of relative value have been summarized (Table 8).

The data shows there was decrease in food consumption in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed decrease was

found to be statistically very significant. The data shows there was decrease in food consumption in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed decrease was found to be statistically very significant.

**3.2.3 Effect on water consumption with data presented in terms of absolute values**

The data related to the effect of *G. ula* seed test formulation on Water consumption on the basis of absolute value have been summarized (Table 9). The data shows there was increase in water consumption in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant.

The data shows there was increase in water consumption in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically very-significant.

The data shows there was increase in water consumption of therapeutic phase of *G. ula* seed when compared to preliminary phase of same group. The observed increase was found to be statistically significant.

**3.2.4 Effect on water consumption with data presented in terms of relative values**

The data related to the effect of *G. ula* seed test formulation on Water consumption on the basis of relative value have been summarized (Table 10). The data shows there was increase in water consumption in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant.

The data shows there was increase in water consumption in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically non-significant.

**Table 7: Effect of *G. ula* seed on food consumption with data presented in terms of absolute values**

Group	Food consumption in g (absolute values)			
	Preliminary phase	% change	Therapeutic phase	% change
Control	11.62 ± 0.37	-	10.95 ± 0.62	-
<i>G. ula</i> seed	12.37 ± 0.68	6.45↑	12.35 ± 0.57	12.78↑

Data: MEAN ± SEM

**Table 8: Effect of *G. ula* seed on food consumption with data presented in terms of relative values**

Group	Food consumption in g/100 g body weight			
	Preliminary phase	% change	Therapeutic phase	% change
Control	6.69 ± 0.24	-	6.05 ± 0.23	-
<i>G. ula</i> seed	5.18 ± 0.11	22.57↓	5.00 ± 0.009**	17.35↓

Data: MEAN ± SEM, \*\*P&lt;0.01 compared with control

**Table 9: Effect of *G. ula* seed on water consumption with data presented in terms of absolute values**

Group	Water consumption in ml(absolute values)			
	Preliminary Phase	% change	Therapeutic Phase	% change
Control	20.33 ± 0.33	-	23.55 ± 1.50	-
<i>G. ula</i> seed	29.83 ± 2.48	46.72↑	34.87 ± 2.74** #	48.06↑

Data: MEAN ± SEM \*\*P&lt;0.01 compared with control #compared with preliminary phase

**Table 10: Effect of *G. ula* seed on water consumption with data presented in terms of relative values**

Group	Water consumption in ml/100g body weight			
	Preliminary Phase	% change	Therapeutic phase	% change
Control	11.78 ± 0.31	-	13.06 ± 0.56	-
<i>G. ula</i> seed	12.48 ± 0.70	5.94↑	14.08 ± 1.08	7.81↑

Data: MEAN ± SEM

**Table 11: Effect of *G. ula* seed on urine output with data presented in terms of absolute values**

Group	Urine output in ml in (absolute values)			
	Preliminary phase	% change	Therapeutic phase	% change
Control	5.32 ± 0.61	-	4.93 ± 0.89	-
<i>G. ula</i> seed	13.1 ± 1.73	146.24↑	9.20 ± 2.07	86.61↑

Data: MEAN ± SEM

**3.2.5 Effect on urine output with data presented in terms of absolute values**

The data related to the effect of *G. ula* seed test formulation on urine output on the basis of absolute value have been summarized (Table 11).

The data shows there was increase in urine output in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant. The data shows there was increase in urine output in therapeutic phase of *G. ula* seed group when compared to control group therapeutic

phase, the observed increase was found to be statistically non-significant.

**3.2.6 Effect on urine output with data presented in terms of relative values**

The data related to the effect of *G. ula* seed test formulation on urine output on the basis of relative value have been summarized (Table 12).

The data shows there was increase in urine output in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant. The data shows there was increase in urine output in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically non-significant.

**3.2.7 Effect on faecal wet with data presented in terms of absolute values**

The data related to the effect of *G. ula* seed test formulation on faecal wet on the basis of absolute value have been summarized (Table 13)

The data shows there was decrease in faecal wet in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed decrease was found to be statistically non-significant. The data shows there was increase in faecal wet in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically non-significant.

**3.2.8 Effect on faecal wet with data presented in terms of relative values**

The data related to the effect of *G. ula* seed test formulation on faecal wet the basis of relative value have been summarized (Table 14).

The data shows there was decrease in faecal wet in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed decrease was found to be statistically non-significant. The data shows there was decrease in faecal wet in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed decrease was found to be statistically non-significant.

**3.2.9 Effect on faecal dry with data presented in terms of absolute values**

The data related to the effect of *G. ula* seed test formulation on faecal dry on the basis of absolute value have been summarized (Table 15).

The data shows there was increase in faecal dry in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant. The data shows there was increase in faecal dry in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically non-significant.

**3.2.10 Effect on faecal dry with data presented in terms of relative values**

The data related to the effect of *G. ula* seed test formulation on faecal dry on the basis of relative value have been summarized (Table 16).

**Table 12: Effect of *G. ula* seed on urine output with data presented in terms of relative values**

Group	Urine output in ml/100g body weight			
	Preliminary phase	% change	Therapeutic phase	% change
Control	3.04 ± 0.36	-	2.73 ± 0.5	-
<i>G. ula</i> seed	4.18 ± 0.46	37.5↑	4.28 ± 0.56	56.77↑

Data: MEAN ± SEM

**Table 13: Effect of *G. ula* seed on faecal wet with data presented in terms of absolute values**

Group	Faecal weight wet in g in absolute values			
	Preliminary phase	% change	Therapeutic phase	% change
Control	5.13 ± 0.28	-	4.13 ± 0.40	-
<i>G. ula</i> seed	5.03 ± 0.43	1.94↓	5.13 ± 0.29	24.21↑

Data: MEAN ± SEM

**Table 14: Effect of *G. ula* seed on faecal wet with data presented in terms of relative values**

Group	Faecal weight wet in g/100 g body weight			
	Preliminary phase	% change	Therapeutic phase	% change
Control	3.02 ± 0.18	-	2.34 ± 0.15	-
<i>G. ula</i> seed	2.09 ± 0.11	30.79↓	2.02 ± 0.05	13.67↓

Data: MEAN ± SEM

The data shows there was decrease in faecal dry in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed decrease was found to be statistically non-significant. The data shows there was decrease in faecal dry in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed decrease was found to be statistically very significant.

**3.2.11 Effect on faecal watery with data presented in terms of absolute values**

The data related to the effect of *G. ula* seed test formulation on food conversion ratio on the basis of absolute value have been summarized (Table 17).

The data shows there was decrease in faecal watery in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed decrease was found to be statistically non-significant. The data shows there

was increase in faecal watery in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically non-significant.

**3.2.12 Effect on faecal watery with data presented in terms of relative values**

The data related to the effect of *G. ula* seed test formulation on faecal watery on the basis of relative value have been summarized (Table 18).

The data shows there was decrease in faecal watery in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed decrease was found to be statistically non-significant. The data shows there was decrease in faecal watery in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed decrease was found to be statistically

**Table 15: Effect of *G. ula* seed on faecal dry with data presented in terms of absolute values**

Group	Faecal weight dry in g (absolute values)			
	Preliminary phase	% change	Therapeutic phase	% change
Control	2.5 ± 0.09	-	2.27 ± 0.14	-
<i>G. ula</i> seed	2.78 ± 0.12	11.2↑	2.53 ± 0.15	11.45↑

Data: MEAN ± SEM

**Table 16: Effect of *G. ula* seed on faecal dry with data presented in terms of relative values**

Group	Faecal weight dry in g/100 g body weight			
	Preliminary phase	% change	Therapeutic phase	% change
Control	1.4 ± 0.065	-	1.24 ± 0.052	-
<i>G. ula</i> seed	1.1 ± 0.05	↓23.28	1.02 ± 0.04**	17.74↓

Data: MEAN ± SEM, \*\*P<0.01 compared with control

**Table 17: Effect of *G. ula* seed on faecal watery with data presented in terms of absolute values**

Group	Faecal watery in (absolute values)			
	Preliminary phase	% change	Therapeutic phase	% change
Control	2.6 ± 0.20	-	2.03 ± 0.27	-
<i>G. ula</i> seed	2.24 ± 0.36	13.84↓	2.57 ± 0.19	26.60↑

Data: MEAN ± SEM

**Table 18: Effect of *G. ula* seed on faecal watery with data presented in terms of relative values**

Group	Faecal weight watery in g /100 g body weight			
	Preliminary phase	% change	Therapeutic phase	% change
Control	1.56 ± 0.12	-	1.09 ± 0.11	-
<i>G. ula</i> seed	1.50 ± 0.21	3.84↓	1.05 ± 0.05#	3.66↓

Data: MEAN ± SEM, #P<0.05 compared with preliminary phase



non-significant. The data shows there was decrease in faecal watery of therapeutic phase of *G. ula* seed when compared to preliminary phase of same group. The observed decrease was found to be statistically significant.

**3.2.13 Effect on food conversion ratio with data presented in terms of absolute values**

The data related to the effect of *G. ula* seed test formulation on food conversion ratio on the basis of absolute values have been summarized (Table 19).

The data shows there was increase in food conversion ratio in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant. The data shows there was decrease in food conversion ratio in therapeutic phase of *G. ula* seed group when compared to control group therapeutic phase, the observed decrease was found to be statistically non-significant.

**3.2.14 Effect on food conversion ratio with data presented in terms of relative values**

The data related to the effect of *G. ula* seed test formulation on food conversion ratio on the basis of relative value have been summarized (Table 20).

The data shows there was increase in food conversion ratio in preliminary phase of *G. ula* seed group when compared to control group preliminary phase, the observed increase was found to be statistically non-significant. The data shows there was increase in food conversion ratio in therapeutic

phase of *G. ula* seed group when compared to control group therapeutic phase, the observed increase was found to be statistically non-significant.

**3.2.15 Effect on bodyweight of rats**

The data related to the effect of *G. ula* seed on percentage change in body weight have been summarized (Table 21).

The data shows there was decrease in percentage change in body weight in *G. ula* seed group when compared to control group, the observed decrease was found to be statistically non-significant.

**3.3 Assessment of Virya**

Endothermic and Exothermic reactions were noted for an hour, the thermometer shows 0.5°C increased in temperature after addition of sample drug.

**4. DISCUSSION**

In this study the *Rasa panchaka* assessment of seeds of *G. ula* was conducted with the help of available models. *Rasa* and *anurasa* of seeds of *G. ula* was analysed by the healthy volunteers in different forms like fresh seed, roasted seed powder, boiled seeds, *kashaya* of fresh seeds and roasted seeds. By seeing all 5 different forms, scoring was given and calculating the total scoring the overall *rasa* and *anurasa* of *G. ula* can be concluded as *pradhana rasa* is *Kashaya* and *madhura, tikta* is *anu rasa*.

**Table 19: Effect of *G. ula* seed on food conversion ratio with data presented in terms of absolute values**

Group	Food conversion ratio (absolute values)			
	Preliminary phase	% change	Therapeutic phase	% change
Control	4.69 ± 0.09	-	4.89 ± 0.07	-
<i>G. ula</i> seed	4.76 ± 0.34	1.49↑	4.77 ± 0.08	2.45↓

Data: MEAN ± SEM

**Table 20: Effect of *G. ula* seed on food conversion ratio with data presented in terms of relative values**

Group	Food conversion ratio in g/100 g body weight			
	Preliminary phase	% change	Therapeutic phase	% change
Control	4.67 ± 0.09	-	4.9 ± 0.05	-
<i>G. ula</i> seed	4.97 ± 0.36	6.42↑	5.10 ± 0.09	4.08↑

Data: MEAN ± SEM

**Table 21: Effect of *G. ula* seed on bodyweight of rats**

Group	% changes in body weight Mean ± SEM	% Change
Control	8.57 ± 2.30	-
<i>G. ula</i> seed	4.50 ± 1.33	47.49↓

Considering the physical parameters and the action of the drug in animals after administration is the analysis of *guna*. In the rat model after drug administration food intake was reduced when compared to control suggests it is having *guru guna*, the faecal of the animals were dry and hard this may be due to *ruksha guna*, the urine output was observed dark in colour and with odour suggests that it is *ushna*, along with that water intake in the animals was very high suggests drug is of *ruksha* and *ushna*. All this suggests the drug possess of *guru, ushna* and *ruksha guna*. And also, as per the experience of local people, it is considered as very *ushna* and not advised to take in large quantity because it may cause *pittavrudhi*, indigestion and diarrhoea. This suggests it is having *guru guna* so it is difficult for digestion. *Pittavrudhi* and diarrhoea suggests it is having *ushna guna*.

*Virya* was assessed by endothermic and exothermic reaction after assessing for an hour, there is 0.5°C rise in temperature after addition of drug so can be assessed its *ushna virya*. As per folk information it is said to be very *ushna*, so has to be consumed in limited quantity.

*Vipaka* is defined as the final transformation of substances after digestion. The commonly accepted number of *rasa* is six. Based on these *rasas* difference of opinion on *vipaka* also developed, but the accepted theory is *trividha vipaka vada*. The *madhura* and *lavana rasa* will be of *madhura vipaka*, *amla rasa* will have *amla vipaka* and *katu, tikta, kashaya rasa* will have *katu vipaka*. The action of *vipaka* takes place at the level of *dosha, dhatu* and *mala*. In this study as it is an animal model it is difficult to assess at *dosha* level. The weights of the animals were maintained, also observed *badha vit* and *alpa mutrata* so it can be taken as *katu vipaka*

As per the folk informers it is used as anthelmintic especially in children given in early morning in empty stomach due to *tikta rasa* it may act as *krimighna*, also if taken in excess it is *pittakara* may be because of *ushna guna*. Due to *guru guna* it is given as a nutritional supplement in children. Seed oil is used in rheumatism this may be due to *ushna guna, tikta-kashaya rasa* and *katu vipaka*. Over all *Rasa panchaka* profile of seeds of *G. ula*, *Pradhana rasa* is *Kashaya*, *Anurasa* is *Madhura-Tikta*, *Guna* is *Guru, Ruksha, Ushna, Virya* is *Ushna* and *Vipaka* is *Katu*.

## 5. CONCLUSION

Folklore science have tremendous source of information regarding the utility of locally available drug both as a food and as medicine in some ailments which have to be properly explored. It needs systematic documentation and measures to protect these valuable medicinal sources as they are in the edge of depletion. Acharyas opined to make use of the drug found in the vicinity after thorough examination and should be incorporated in Ayurvedic Pharmacopoeia. Ayurveda describes the properties of a drug on the basis of *rasa panchaka, rasa, guna, virya, vipaka* and *prabhava*. The mode of action can be explained in a better way with the help of *rasa panchakas*. So, while studying a new drug the assessment of *rasapanchaka* has an important role.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## CONTRIBUTORS

Dr. T. Shridhara Bairy did design of the work and provided valuable information, Mr. Sudhakar did true help in providing references and statistical assisting. Dr. K.N. Sunil Kumar and Dr. Ravi Krishna Aithal contributed to conceptualization of the topic and manuscript editing.

## ABBREVIATIONS

**GI tract:** Gastro intestinal tract.

## SUMMARY

*Gnetum ula* Brongn. a folk plant from Gymnosperm of Gnetaceae family present in and around Udupi, locally called as “*kumti beej*”. Folklore medicine has tremendous source of information regarding the utility of locally available plants as food and as medicines, the seeds of this plant are used for edible purpose either roasted or boiled as it is considered as very nutritious. Such plants have to be properly explored and scientifically documented before putting into use so this study has conducted and study revealed seeds of *G. ula* having, *kashaya* as *pradhana rasa*, *anurasa* is *madhura-tikta*, *guna* is *guru, ruksha* and *ushna*. *Virya* is *ushna* and *vipaka* is *katu*.

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