

# The Study On Proximate Composition Of Different Species Of Genus *Grewia* From Western Maharashtra

SONAWANE PRADIP PUNDLIK

Department of Botany, Arts, Commerce and Science College, Lasalgaon, Niphad Dist Nasik

Corresponding Author Email:pradipsonawane68@gmail.com

## Abstract-

The present study aimed to investigate the nutritional composition hence the biochemical analysis viz., dry matter, crude protein, crude fat, crude fibre, cellulose, carbohydrates, total ash and gross energy of selected plant parts of ten species of *Grewia* (*G. asiatica*, *G. abutilifolia*, *G. damine*, *G. flavescence*, *G. aurantifolia*, *G. nervosa*, *G. serrulata*, *G. orbiculata*, *G. villosa*, *G. tenax* and *G. tilifolia*) was carried out. Different parts of these plants possess different pharmacological properties. Leaves have antimicrobial, anticancer, antiplatelet and antiemetic activities; Fruits are a rich source of nutrients and contain various bioactive compounds.

**Keywords:**, Biochemical analysis, proximate composition, pharmacological properties, nutrients, bioactive compounds.

## INTRODUCTION:

*Grewia* is a genus of approximately 150 species of family Tiliaceae which include small trees and shrubs, distributed in subtropical and tropical regions of the world. The plants having medicinal importance are particularly being used by the traditional users since the ancient time but they do not have much scientific information. The fruit, leave, bark of *Grewia* species have high medicinal values and are widely used for the treatment of various common diseases and presence of different metabolites like saponins, coumarins and anthraquinone (Sharma and Patni, 2013). Several species of *Grewia* are used as a very important multipurpose or agro forestry tree (Coleman, 1982). *Grewia tenax* and *Grewia villosa* were identified as food producing species and that they are consumed during time of food shortage (Tahir *et al.*, 2004), despite this they are underutilized (Looy *et al.*, 2008). Leaves and seeds from a range of trees and shrubs were found to have a good potential to supply highly digestible feeds suitable for ruminants (Sánchez, 2004). Most of the genuses of Tiliaceae family are wild and known for their fodder, fuel wood, craft works, timbers and therapeutic values viz. *Grewia flavescens* A. Juss, *Grewia villos* and *Grewia hirsuta*. *Grewia* is the only genus in family Tiliaceae with edible fruits. Extensively cultivated species for their fruit values are *G. subinaequalis* DC. (syn.*G. asiatica*.) and *Grewia tenax* (Frosk.) (Youngken, 1951). Despite the varied utilizations of *Grewia* species, it has suffered notable disregard so here documenting the biological and chemical studies of some of the species of *Grewia* that are indigenous in flora of India. The extracts from the plant of *Grewia* are known to have medicinal properties (Rosa *et al.*, 2006). The presence of various biofunctional and chemo-preventive compounds in different parts of plant, believed to have health-boosting properties, are a major reason for their increased consumption and the medicinal plants have always been an exemplary source (Kaur and Kapoor, 2005).

## MATERIAL AND METHODS:

Experimental work was carried out on the leaves of selected *Grewia* species. To carry out pharmacognostic investigation from species of genus *Grewia* vi., *Grewia asiatica*, *Grewia abutilifolia*, *Grewia damine*, *Grewia flavescence*, *Grewia aurantifolia*, , *Grewia nervosa*, *Grewia serrulata* , *Grewia orbiculata*, *Grewia villosa*, *Grewia tenax* and *Grewia tilifolia*. The plant samples were collected from different localities of Maharashtra state viz., Sangli, Satara, Sholapur, Kolhapur and Pune. The material was collected in polythene bags and brought to the laboratory for the biochemical analysis.

**Determination of Dry Matter:** The dry matter was determined on the basis of the AOAC method. The dry matter was calculated by following equation.

$$\text{Dry matter \%} = \frac{\text{weight of dry matter}}{\text{Fresh weight of sample}} \times 100$$

**Determination of Total protein (Nitrogen):** The protein content was determined from the organic Nitrogen content by Kjeldahl method. The protein content was calculated by following equation.

**Protein content** = 1 ml of 0.1 N H<sub>2</sub>SO<sub>4</sub> = 0.0014gm N. Calculate protein as N × 6.25 Protein on dry wt. basis = Protein content x 100 (100–Moisture content)

**Determination of Crude fiber:** The determination of crude fibre was based on the basis of AOAC (1970) method.

$$\text{Crude fibre (\%)} = \frac{(\text{Dry weight of digested sample} - \text{Weight of ash})}{\text{Weight of sample}} \times 100$$

W<sub>1</sub> = Wt in gm of gooch crucible and contents before ashing

W<sub>2</sub> = Wt in gm of gooch crucible containing asbestos and ash

W = Wt in gm of the dried material taken for the test

Calculated crude fiber on dry wt. basis by giving correction for the moisture content

**Determination of Crude Fat:** The ash content was determined by AOAC (1970) method. The sample of oil seed was grinded and taken on filter paper, weighed it, the weight was noted. The thimble was made. The thimble was wrapped with thread and put the thimble in extraction set. 200 ml solvent (Hexane) was added and kept the extraction set in heating mental and heated for 8-10 hrs. The solvent was recovered after 8-10 hrs from flask and kept the oil bearing flask in oven at 130°C, after completed drying, cooled the flask and weighed up to constant weight.

$$\text{Crude Fat (\%)} = \frac{\text{Weight of the sample}}{\text{Weight of fat}} \times 100$$

**Determination of Total Ash:** The ash content was determined by AOAC (1970) method. The dried material was ignited in the dish left after the determination of moisture with the flame of a burner till charred. It was transferred to a muffle furnace maintained at 550 - 600°C and ignition was continued till grey ash was obtained. It was cooled in a desiccator and weight was measured. The process was repeated for heating, cooling and weighing at half hour interval till the difference in weight in two consecutive weighing was less than 1 mg. The lowest weight was recorded.

$$\text{Total Ash (\%)} = \frac{(W_2 - W_1)}{W - W} \times 100$$

W<sub>1</sub>-W

Where

W<sub>2</sub> = Weight in gm of the dish with the ash

W = Weight in gm of empty dish

W1 = Weight in gm of the dish with the dried material taken for test.

**Determination of Cellulose:** The cellulose content was determined by AOAC (1970) method. The cellulose content was calculated from standard graph and optical density taken of sample.

**Determination of Carbohydrates:** Total carbohydrate (TC) was determined by differential method of (Janardhanan and Lakshmanan, 1985). This was achieved by subtracting the total protein, lipid, moisture and ash content from 100.

% TC = % NFE + % CF or

% TC = 100 - (% CP + % Cfat + % ash)

#### GROSS ENERGY (GE):

The chromic acid oxidation method described by O'shea and Maguire (1962) was followed to determine gross energy (GE) and the amount of GE was determined and calculated in Kcal per g of sample using the following equation:

$$\text{GE (Kcal/g DM)} = \frac{\text{ml 1.5 N K}_2\text{Cr}_2\text{O}_7 \text{ used to oxidize 1g sample}}{(23.39 - 0.069 P + 0.000226 P^2)}$$

Where P is the crude protein (CP) the content in the sample expressed as per cent of dry matter (DM).

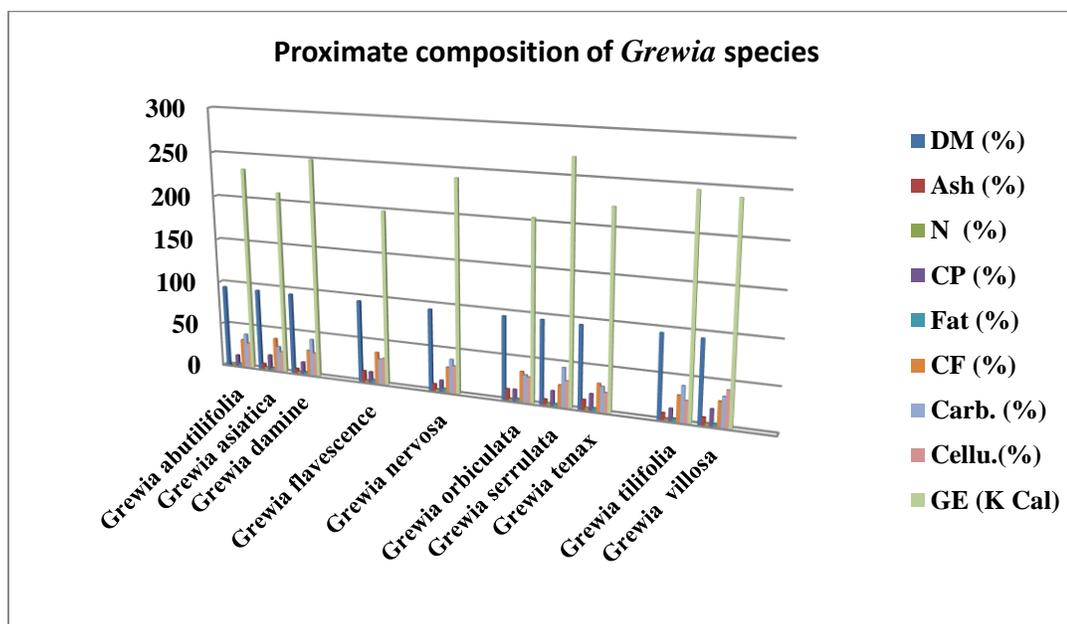
#### RESULTS AND DISCUSSION:

The present study was carried out to determine the proximate composition viz., dry matter, crude protein, crude fat, crude fibre, cellulose, total ash, carbohydrates and gross energy from different *Grewia* species. The selected species were viz., *Grewia asiatica*, *Grewia abutilifolia*, *Grewia damine*, *Grewia flavescence*, *Grewia nervosa*, *Grewia orbiculata*, *Grewia serrulata*, *Grewia tenax*, *Grewia tilifolia* and *Grewia villosa*. As depicted in the table no.1, the *Grewia abutilifolia* contained dry matter (94.1%), ash (6.9%), nitrogen (2.03%), crude protein (12.69%), fat (2.82%), crude fibre (32.30%), carbohydrates (39.4%), cellulose (28.8%) and gross energy (233kcal) on the basis of percent dry matter yield. The result of the biochemical analysis revealed that *Grewia asiatica* showed amount of dry matter, ash, nitrogen, crude protein, crude fat, crude fibre, carbohydrate, cellulose and gross energy (kcal) in the percentage of 93.75%, 6.30%, 2.80%, 17.50%, 2.60%, 38.33%, 29.00%, 23.30% and 209 (kcal) respectively. Earlier work was carried out by (Toukhey *et al.* 2005) who recorded values for dry matter and crude protein from some two *Grewia* species. The concentration of dry matter, ash, nitrogen, crude protein, crude fat, crude fibre, carbohydrate, cellulose and gross energy (kcal) from *Grewia damine* recorded was 93.50%, 5.43%, 2.24%, 14.00%, 2.55%, 29.10%, 42.40%, 26.6% and 249 (kcal) respectively. In response to proximate determination, the *Grewia flavescence* has the amount of dry matter (94.25%), ash (12.87%), nitrogen (2.00%), crude protein (12.51%), fat (3.65%), crude fibre (36.30%), carbohydrates (28.90%), cellulose (30.23%) and gross energy (198kcal). The result of biochemical analysis based on the dry matter percentage of *Grewia nervosa* revealed that the values of dry matter, ash, nitrogen, crude protein, crude fat, crude fibre, carbohydrate, cellulose and gross energy (kcal) were 93.30%, 8.00%, 2.07%, 12.96%, 3.86%, 29.10%, 38.60%, 31.20% and 240 (kcal) respectively. The results of Singh *et al.* (2004) showed that the values for crude proteins were greater in leaves of *Grewia* plants. From the leaf powder analysis based on the dry matter of *Grewia orbiculata* the percentage values were recorded of dry matter, ash, nitrogen, crude protein, crude fat, crude fibre, carbohydrate, cellulose and gross energy (kcal) and that were 94.50%, 12.67%, 2.10%, 13.15%, 3.12%, 34.44%, 31.10%, 29.20% and 204 (kcal) respectively. The Table No. 1, shows that the *Grewia serrulata* has values for dry matter (95.00%), total ash (6.48%), nitrogen (2.71%), crude protein (16.86%), crude fat (2.75%), crude fibre (24.44%), carbohydrate (44.40%), cellulose (29.90%) and the gross energy (270kcal). Papanastasis *et al.* (2008) recorded higher ash content from *Grewia* fodder species. Similarly, the proximate elements were determined from *Grewia tenax* and

those were dry matter (94.00%), ash (11.48%), nitrogen (3.02%), crude protein (18.92%), fat (3.64%), crude fibre (31.40%), carbohydrates (28.60%), cellulose (22.20%) and gross energy (222kcal). The results of biochemical composition also indicated that *Grewia tilifolia* consisted of dry matter (94.50%), ash (7.93%), nitrogen (2.20%), crude protein (13.76%), fat (3.32%), crude fibre (29.30%), carbohydrates (40.10%), cellulose (24.40%) and gross energy (245kcal). The proximate composition table indicated that the proportion of dry matter, ash, nitrogen, crude protein, crude fat, crude fibre, carbohydrate, cellulose and gross energy (kcal) in *Grewia villosa* was 94.50%, 12.67%, 2.10%, 13.15%, 3.12%, 34.44%, 31.10%, 29.20% and 204 (kcal) respectively. The present study revealed that *Grewia serrulata* yielded highest amount of dry matter (95.00%) amongst all other species. The highest concentration of total ash (12.87%) was found in *Grewia flavescence* compared to other species. *Grewia tenax* showed maximum concentration of nitrogen (3.02%) over all other species of *Grewia*. The crude protein (18.92%) was found to be highest in *Grewia tenax* as compared to other species. *Grewia nervosa* yielded maximum amount of crude fat (3.86%) in proximate study. The concentration of crude fibre was recorded the maximum in *Grewia asiatica* (38.33%). During the proximate study the carbohydrate was found to be the maximum in *Grewia serrulata* (44.40%). The amount of cellulose (41.10%) was measured to be the highest in *Grewia villosa* while the gross energy was recorded to be the maximum in the species *Grewia serrulata* (270).

**Table No. 1: Proximate composition of different species of genus *Grewia***

| Plant Name                 | DM (%) | Ash (%) | N (%) | CP (%) | Fat (%) | CF (%) | Carb. (%) | Cellu. (%) | GE (K Cal) |
|----------------------------|--------|---------|-------|--------|---------|--------|-----------|------------|------------|
| <i>Grewia abutilifolia</i> | 94.10  | 6.90    | 2.03  | 12.69  | 2.82    | 32.30  | 39.40     | 28.80      | 233        |
| <i>Grewia asiatica</i>     | 93.75  | 6.30    | 2.80  | 17.50  | 2.60    | 38.33  | 29.00     | 23.30      | 209        |
| <i>Grewia damine</i>       | 93.50  | 5.43    | 2.24  | 14.00  | 2.55    | 29.10  | 42.40     | 26.6       | 249        |
| <i>Grewia flavescence</i>  | 94.25  | 12.87   | 2.00  | 12.51  | 3.65    | 36.30  | 28.90     | 30.23      | 198        |
| <i>Grewia nervosa</i>      | 93.30  | 8.00    | 2.07  | 12.96  | 3.86    | 29.10  | 38.60     | 31.2       | 240        |
| <i>Grewia orbiculata</i>   | 94.50  | 12.67   | 2.10  | 13.15  | 3.12    | 34.44  | 31.10     | 29.20      | 204        |
| <i>Grewia serrulata</i>    | 95.00  | 6.48    | 2.71  | 16.86  | 2.75    | 24.44  | 44.40     | 29.90      | 270        |
| <i>Grewia tenax</i>        | 94.00  | 11.48   | 3.02  | 18.92  | 3.64    | 31.40  | 28.60     | 22.20      | 222        |
| <i>Grewia tilifolia</i>    | 94.5   | 7.93    | 2.2   | 13.76  | 3.32    | 29.3   | 40.1      | 24.4       | 245        |
| <i>Grewia villosa</i>      | 93.2   | 8.71    | 3.0   | 18.81  | 3.38    | 28.31  | 33.8      | 41.1       | 240        |



Graph No. 1:

**CONCLUSION:**

During the present study it was indicated that *Grewia* species exhibit amount of biochemical compounds known to be present and rich in proximate concentration. The present study confirmed that the leaves of these *Grewia* species exhibit the increased proximate composition viz. total dry matter and nitrogen content. The further detailed investigation regarding bioactive compounds of different species needs to be explored.

**ACKNOWLEDGEMENT:**

The author is thankful to the management of N.V.P. Mandal and the Principal of Arts, Science and Commerce College, Lasalgaon, Niphad Dist Nasik for allowing in completing the undertaken work in the authorized research laboratory and providing the facilities during conducting research work.

**REFERENCES:**

1. Coleman, (1982). Chromosome numbers of angiosperms collected in the state of Sao Paulo. *Brazilian Journal of Genetics*. **5**(3):533-549.
2. Janardhanan, K. and Lakshmanan, K. K. (1985). Studies on the pulse *Mucuna utilis*: chemical composition and antinutritional factors. *Journal of Food Science and Technol.* **22**: 369 – 371.
3. Kaur, C. and Kapoor, H. C. (2005). Antioxidant activity of some fruits in Indian diet. In ISHS Acta Horticulture. VII International Symposium on Temperate Zone Fruits in the Tropics and Subtropics, Part Two. Pp. 696.
4. Looy, T.V. Carrero, G. O. Mathijs, E. and Tollens, E. (2008). Underutilized agroforestry food products in Amazonas (Venezuela): A market chain analysis, *Agroforest Systems* **74**:127-141.
5. O'shae, J. and Maquire, M. F. (1962). *Journal of Science and Food Agriculture*. (13):530.
6. Papanastasis, V. P., Yiakoulaki, M. D. Decandia, M. and Dini, O. (2008). Integrating woody species into livestock feeding in the Mediterranean areas of Europe. *Animal Feed Sci. and Technology* **140**(1/2): 1-17.

7. Rosa, R. M. Melecchi, M. I. S. Halmenschlager, R. D. C. Abad, F. C. Simoni, C. R. Caramao, E. B. Henriques, J. A. P. Saffi, J. and Ramos, A. (2006). *Antioxidant and antimutagenic properties of Hibiscus tiliaceus L. methanolic extract. Agriculture and Food Chemistry*. **54**:7324-7330.
8. Sánchez, F. J. S. Yañez, I. A. and Vera, J. K. (2004). Chemical composition and in vitro dry matter digestibility of some fodder trees from South-East México, *Livestock Research for Rural Development*.
9. Sharma, N. and Patni, V. (2013). In vivo and in vitro qualitative phytochemical screening of *Grewia* species. *International Journal of Biology Pharmaceutical Research*. **4**(9):634-639.
10. Singh, R. Misri, B. and Radotra S. (2004) Chemical composition of some fodder tree leaves used for animal feeding in Chamba District of Himachal Pradesh. *Range Management and Agroforestry* **25**(2): 177-179.
11. Toukhy, E. and Ahmed, K. M. (2005) Response of Halophyte fodder shrubs to cutting intervals and organic manure applications. *Egyptian Journal of Agronomy* **27**(2): 71-80.
12. Tahir, B. A. E. and Gebauer, J. (2004). Non-timber forest products: Opportunities and constraints for poverty reduction in the Nuba mountains, South Kordofan, Sudan, *Deutscher Tropentag*,
13. Youngken, H. W. (1951). *Pharmaceutical Botany*. McGraw-Hill Book Co. New York.