
A Comparative Evaluation of Fiber Content of the Under-Utilized Seeds

D. Jayasudha*, R. Mary Josephine**

Author Affiliation

*Research Scholar **Associate Professor,
Department of Botany, Nirmala College for Women,
Coimbatore, Tamil Nadu 641 018, India.

Corresponding Author

R. Mary Josephine, Associate Professor,
Department of Botany, Nirmala College for Women,
Coimbatore, Tamil Nadu 641 018, India.
E-mail: mary_josephine47@yahoo.com

Abstract

Demand for health oriented products such as sugar-free, low calorie and high fiber products are increasing. One such recent trend is to increase the fiber content in food products to overcome health problems such as hypertension, diabetes, and colon cancer, among others. Consumption of high fiber products consisting of indigestible cellulose, hemicellulose, lignin and gums has several health benefits. Apart from these benefits, β -glucan-rich fibers have the benefit of reducing the absorption of glucose. Most of the plant resources are consumed as food, especially seed based foods are consumed by human beings and animals. Few seeds are utilized entirely by human beings and animals, most of the seeds are under -utilized. The study present showed all the selected seed samples were found to be rich in fiber content and it can be used as value added products.

Keywords: Under-Utilized; Seeds; Fiber; Indigestible Cellulose; Diabetes; Colon Cancer.

Introduction

The most precious gift in the life is good health with which debilitating disease can be avoided and life span can be increased. Being physically health is of prime importance in life (Koushika and kalpana, 2017). The world population explosion of 20th century presents human world with one of its most complex challenge - "Food" and this challenge is higher in low income countries of the world (Neena Arora, 2017). Most of the developing countries like India and other developing countries, a rapid nutritional transition is undergoing due to globalization and urbanization resulting in excessive consumption of calories especially in the form of carbohydrate and saturated fat based food items, which are the main stable food which supply all nutritional requirements (Kathirvel, 2009) and these consumption pattern are highly skewed bad

to other nutrient deficiencies. Dietary fiber also known as roughage or bulk includes the parts of plant foods your body can't digest or absorb. Dietary fiber is the food fraction that is not enzymatically degraded within the human alimentary digestive tract. One recent trend is to increase the fiber content in food products to overcome health problems and such as hypertension, diabetes, and colon cancer among others. Consumption of high fiber products consisting of indigestible cellulose, hemicelluloses, lignin and gums have several health benefits (Sudha, et al., 2007). As well as nowadays dietary fiber to a wide range of products will contribute to the development of value added foods or functional foods that currently are in high demand (Sudha et al., 2007; Day et al., 2009; Shahidi, 2009; Peressini and Sensidoni 2009; Parrado, 2006; Pacheco de Delahaye et al., 2005; Quershi, et al., 2002).

Seeds of plants are a good source of food for

animals, including humans. The majority of foods consumed by human beings are seed-based foods. Edible seeds include cereals (corn, wheat, rice, etc), legumes (beans, peas, lentils, etc), and nuts. Oilseeds are often pressed to produce rich oils - sunflower, flaxseed, rapeseed (including canola oil) and sesame, etc. (http:1). Most of the seed resources are available naturally are not being used to their fullest potential called under-utilized seeds. Due to the increasing population, natural deserter, nutrition deficiencies, in adequate amount of fiber rich food there is immediate need for additional fiber sources. The importance of fiber in the diet is very well established by (Burkitt & Trowell, 1975; Schneeman, 1986; Dreher, 1987), a new non-conventional sources of fiber reported by (Mathews et al., 1993), effect of enrichment with hemicellulose from rice bran have reported (Hu, et al., 2009).

Materials and Methods

Study Area

The selected seed samples were collected from different places in Periyakarattupatti and Oddanchatram in Dindigul, District in Tamilnadu, India; Sungam, town hall in Coimbatore District, Tamilnadu India represented in (Fig. 1).

Sample Collection

Fifteen selected seed samples such as Sample 1 (*Annona squamosa* L.), Sample 4 (*Azadirachta indica* A. Juss), Sample 5 (*Ziziphus mauritiana* Lam.), Sample 6 (*Tamarindus indica* L.), Sample 7 (*Pithecellobium dulce* (Roxb.) Benth.), Sample 8 (*Syzygium cumini* (L.) Skeels), Sample 9 (*Cucurbita maxima* Duchesne), Sample 11 (*Manilkara zapota* (L.) P. Royen), Sample 13 (*Phyllanthus acidus* (L.) Skeels), Sample 14 (*Phyllanthus emblica* L.), various farm houses in Periyakarattupatti village, Dindigul District, TamilNadu , India. Sample 15 (*Phoenix dactylifera* L.) and Sample 10 (*Cucumis melo* L.) collected from fruit stall in Oddanchatram and Sample 2 (*Carica papaya* L.) Sample 3 (*Citrus limetta* Risso) seeds were collected from local fruit seller of Sungam and Sample 12 (*Ocimum basilicum* L.) were collected traditional medicinal store K.P.N traders Town hall Coimbatore, Tamil Nadu , India.

Table 1: Selected seed samples

S.no	Samples	Botanical Name	Family
1	Sample 1	<i>Annona squamosa</i> L.	Annonaceae
2	Sample 2	<i>Carica papaya</i> L.	Caricaceae
3	Sample 3	<i>Citrus limetta</i> Risso	Rutaceae
4	Sample 4	<i>Azadirachta indica</i> A. Juss	Meliaceae
5	Sample 5	<i>Ziziphus mauritiana</i> Lam.,	Rhamnaceae
6	Sample 6	<i>Tamarindus indica</i> L.	Fabaceae
7	Sample 7	<i>Pithecellobium dulce</i> (Roxb.) Benth	Mimosaceae
8	Sample 8	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae

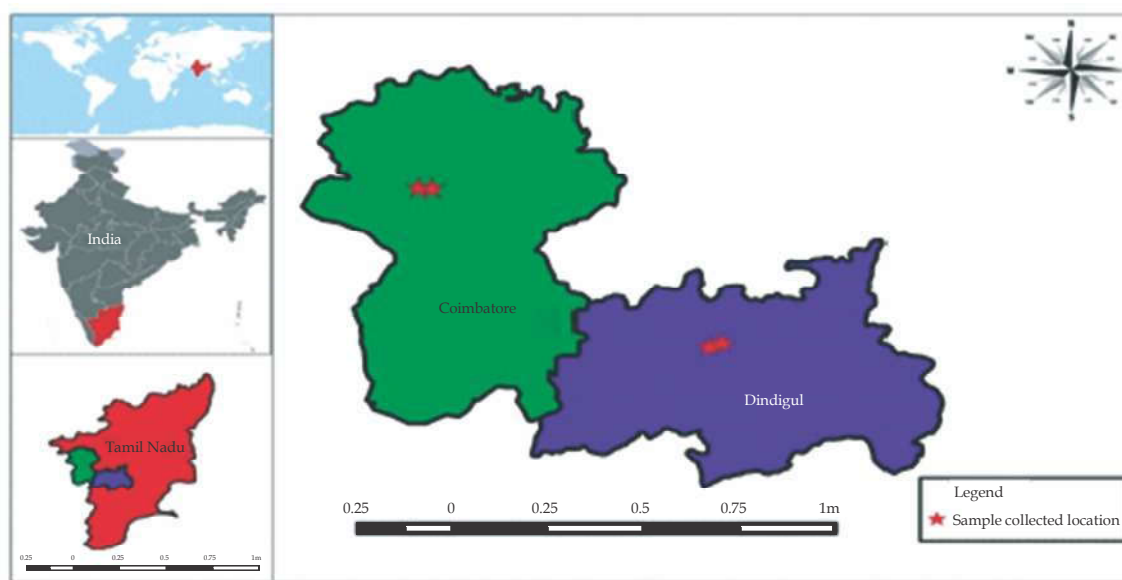


Fig. 1: Study Area

9	Sample 9	<i>Cucurbita maxima</i> <i>Duchesne</i>	Cucurbitaceae
10	Sample 10	<i>Cucumis melo</i> L.	Cucurbitaceae
11	Sample 11	<i>Manilkara zapota</i> (L.) P. <i>Royen</i>	Sapotaceae
12	Sample 12	<i>Ocimum basilicum</i> L.	Lamiaceae
13	Sample 13	<i>Phyllanthus acidus</i> (L.) <i>Skeels</i>	Euphorbiaceae
14	Sample 14	<i>Phyllanthus emblica</i> L.	Euphorbiaceae
15	Sample 15	<i>Phoenix dactylifera</i> L.	Arecaceae

Plate 1:



Plate 1. (a): Entire plant - *Annona squamosa* L.

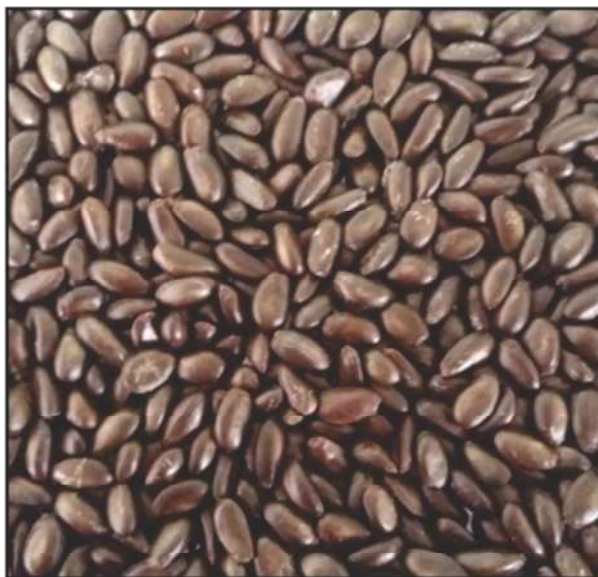


Plate 1. (b): Dried seeds of *Annona squamosa* L.

Plate 2:



Plate 2. (a): Entire plant- *Carica papaya* L.



Plate 2. (b): Dried seeds of *Carica papaya* L.

Plate 3:



Plate 3. (a): Entire plant-*Citrus limetta* Risso



Plate 3. (b): Dried seeds of *Citrus limetta* Risso

Plate 4:



Plate 4. (a): Entire plant - *Azadirachta indica* A.Juss.



Plate 4. (b): Dried seeds of *Azadirachta indica* A.Juss.

Plate 5:



Plate 5. (a): Entire plant- *Ziziphus mauritiana* Lam.,



Plate 5. (b): Dried seeds of *Ziziphus mauritiana* Lam.,

Plate 6:



Plate 6. (a): Entire plant- *Tamarindus indica* L.



Plate 6. (b): Dried seeds of *Tamarindus indica* L.

Plate 7:



Plate 7(a): Entire plant -*Pithecellobium dulce*(Roxb.) Benth



Plate 7 (b): Dried seeds of *Pithecellobium dulce* (Roxb.) Benth

Plate 8:



Plate 8. (a): Entire plant- *Syzygium cumini* (L.) Skeels



Plate 8. (b): Dried seeds of *Syzygium cumini* (L.) Skeels

Plate 9:



Plate 9. (a): Entire plant-*Cucurbita maxima* Duchense



Plate 9. (b): Dried seeds of *Cucurbita maxima Duchense*

Plate 10:



Plate 10. (a): Entire plant- *Cucumis melo L.*

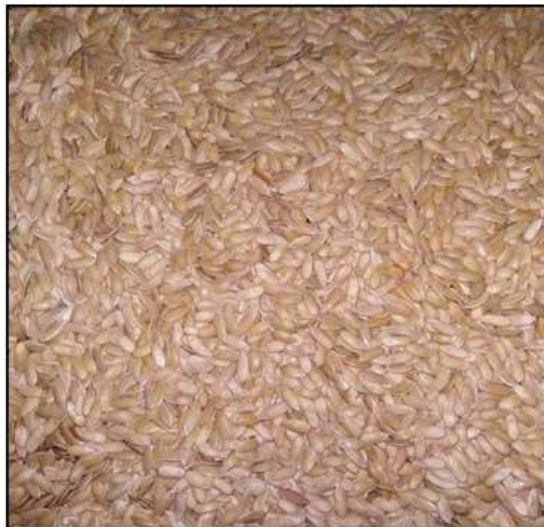


Plate 10. (b): Dried seeds of *Cucumis melo L.*

Plate 11:



Plate 11. (a): Entire plant-*Manilkara zapota (L.) P. Royen*



Plate 11. (b): Dried seeds of *Manilkara zapota (L.) P. Royen*

Plate 12:



Plate 12. (a): Entire plant-*Ocimum basilicum L.*



Plate 12. (b): Dried seeds of *Ocimum basilicum L.*

Plate 13:



Plate 13. (a): Entire plant- *Phyllanthus acidus (L.) Skeels*



Plate 13. (b): Dried seeds of *Phyllanthus acidus (L.) Skeels*

Plate 14:



Plate 14. (a): Entire plant- *Phyllanthus emblica L.*



Plate 14. (b): Dried seeds of *Phyllanthus emblica L.*

Plate 15:



Plate 15. (a): Dry fruits of *Phoenix dactylifera L.*



Plate 15. (b): Dried seeds of *Phoenix dactylifera* L.

Preparation of the Sample

The selected seed samples were collected from farmhouses of Periyakarapatti village, fruit stall in Dindigul District and Sungam and Town hall in Coimbatore District. The collected seed samples were washed with water to remove the debris, sand particles, fleshy part of the fruits and vegetables then transfer to the laboratory and once again washed thoroughly using fresh water. The water was drained off and the seed samples were speared on blotting paper to remove excess of water. They were shade dried and then grounds to homogenous powder using pulverize and stored in an airtight container to the refrigerators at 4°C and were used for further analysis.

Crude Fiber Content (Aoac, 1970)

After extraction with ether, the left - out residue was successively digested with 0.255 N H₂SO₄ solutions and 0.313 N NaOH solutions. After digestion, it was washed with boiling water followed by absolute ethanol in a Gooch crucible. The content of the crucible were dried to constant weight, cooled weighed and ignited in an electric muffle furnace. After cooling, the contents were reweighed. The loss in weight was expressed as percentage of crude fiber on dry weight basis.

Results and Discussion

The fibre content of the selected fifteen seed samples were represented in (Table 2 and chart

1). The fiber content of the selected samples were ranged from *Phoenix dactylifera* L. (31%) to *Carica papaya* L. (14.26%).

Fiber content was rich in selected samples namely *Phoenix dactylifera* L. (31%), *Tamarindus indica* L. (26.05%), *Phyllanthus emblica* L. (25.24 %), *Ziziphus mauritiana* Lam., (25.47%), *Syzygium cumini* (L.) Skeels (25.72%), *Cucurbita maxima* Duchense (20.18%), *Phyllanthus acidus* (L.) Skeels (20.60%), *Manilkara zapota* L. (19.23%), *Azadirachta indica* A. Juss (17.05%), *Annona squamosa* (17.61%), *Cucumis melo* L. (17.79%), *Citrus limtta* Risso (15.34%), *Ocimum basilicum* L. (15.96%), *Pithecellobium dulce* (Roxb.) Benth (14.92), *Carica papaya* L. (14.26%).

Phoenix dactylifera L. found to be having highest amount of fibers when compared with earlier reports (Devshony et al., 1992 Sawaya et al., 1984) and lower than the earlier reports of (Hamada et al., 2002 Habib et al., 2009). In this variations occurred may be due to environmental factors. However most of the selected seed samples are contain high amount of fiber content and also above the RDA for children and lactating mothers, which were 19-25% and 29% respectively (Ishola et al., 1990). The following samples contain below RDA values *Azadirachta indica* A. Juss (17.05%), *Annona squamosa* L. (17.61%), *Cucumis melo* L. (17.79%), *Citrus limttal* Risso (15.34%), *Ocimum basilicum* L. (15.96%), *Pithecellobium dulce* (Roxb.) Benth (14.92) *Carica papaya* L. (14.26%).

Dietary fiber intake provides many health benefits. A generous intake of dietary fiber reduces risk for developing the following diseases: coronary heart disease (Liu, et al., 1999), stroke (Steffen et al., 2003) hypertension (Whelton, et al., 2005), diabetes (Montonen, et al., 2003) obesity (Lairon, et al., 2005) and certain gastrointestinal disorders (Petruzzello et al., 2006). In addition, increased consumption of dietary fiber improves serum lipid concentrations (Brown, et al., 1999), lowers blood pressure (Keenan, et al., 2002), improves blood glucose control in diabetes (Anderson, et al., 2004), promotes regularity (Cummings, et al., 2001), aids in weight loss (Birketvedt, et al., 2005) and appears to improve immune function (Watzl, et al., 2005).

Table 2: Fibre content of the selected samples

S.No	Samples	Fiber %
1	<i>Annona squamosa</i> L.	17.61
2	<i>Carica papaya</i> L.	14.26
3	<i>Citrus limetta</i> Risso	15.34
4	<i>Azadirachta indica</i> A.Juss	17.05
5	<i>Zizipulus mauritiana</i> Lam.,	25.47

6	<i>Tamarindus indica</i> L.	26.05
7	<i>Pithecellobium dulce</i> (Roxb.) Benth	14.92
8	<i>Syzygium cumini</i> (L.) Skeels	25.72
9	<i>Cucurbita maxima</i> Duchesne	20.18
10	<i>Cucumis melo</i> L.	17.79
11	<i>Manilkara zapota</i> (L.) P. Royen	19.23
12	<i>Ocimum basilicum</i> L.	15.96
13	<i>Phyllanthus acidus</i> (L.) Skeels	20.60
14	<i>Phyllanthus emblica</i> L.	25.24
15	<i>Phoenix dactylifera</i> L.	31.00

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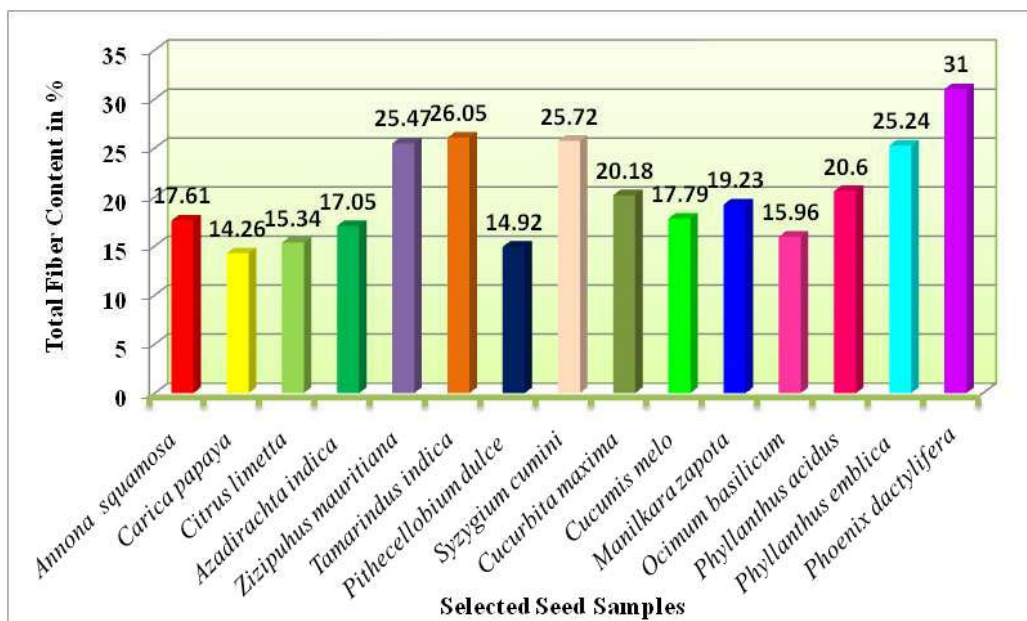


Chart 1: Fibre content of the selected samples

Conclusion

All the selected under-utilized seed samples were found to be having the highest amount of fiber content and recommended for children and lactating mothers. Consumption of high fiber products consisting of indigestible cellulose, hemicelluloses, lignin and gums have several health benefits. As well as nowadays dietary fiber to a wide range of products will contribute to the development of value added foods or functional foods that currently are in high demand.

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