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Research Article

PROXIMATE COMPOSITIONS OF SOME COMMON FRUIT SEEDS AVAILABLE IN WEST BENGAL

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The present study was carried out to estimate the proximate compositions, fibre fractions acid detergent fibre (ADF) and neutral detergent fibre (NDF) and calcium content of guava, tamarind, watermelon, orange, papaya and date seed powders. The results showed that the seed powders under study can be considered as important new sources of crude fibre, crude protein, ether extract and nitrogen free extract (NFE). This analytical study showed that these seed powders contained good amount of calcium and are insoluble fibre. Among these fruit seeds both guava and date seeds are rich in crude fibre, both tamarind and orange seeds are rich in nitrogen free extract and watermelon, orange and papaya seed powders contain high amount of ether extract.

Key words: ADF, Calcium, Fruit seeds, NDF, Nutrient dense, Proximate compositions

Fruit seeds usually rejected by human beings contain amazing nutrients inside them. They are considered as 'waste material' in both daily human life and industrial purpose. In the food processing industry, edible portions of fruits are processed into products such as puree, canned slices, juice and pickles; whereas seeds are often discarded as waste since it is not currently utilized for commercial purposes (Ajila *et al*., 2007). Seeds are also promising source of useful compounds because of their favourable technological or nutritional properties (Schieber *et al*., 2001).

Study showed that Guava waste can be used as an alternative ingredient in feed for

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broiler chickens at levels of up to 12%, with no effect on the productive performance of the birds or the economic viability of the production (Zootec, 2009). The tamarind seed meal has been recommended as a source of protein for cattle (Barman and Rai, 2006). The high tannin content of tamarind pod husks may be useful to depress methane production in crossbred dairy cow (Barman and Rai, 2006). Citrus seeds are sometimes collected separately at the canning plants and subjected to an oil extraction process. The resulting oil cake is usually called citrus seed meal and compares favourably with many sources of vegetable protein. However, it contains limonin, a factor toxic to pigs and especially to poultry. It is acceptable to ruminants and comparable to cottonseed oil cake with the same percentage of crude protein. The nutritional value of date seed meal is very low, due to the low protein content and the very high fibre content. It can be used in poultry feeds provided that this low energy content is taken into account in feed formulation and compensated by the addition of fat (Hussein *et al*., 1998).

Various studies showed that the growth rate of poultry and cattle is very much satisfactory by feeding of these fruit seeds cake or powder. The fruit and food processing industries may start a by-product business by these fruit seeds (highly dense in valuable nutrients), after proper microbiological and biochemical tests and there by make it beneficial to the cattle farmers and poultry industry.

The present study was undertaken to assess proximate compositions, mineral content (calcium), fibre fraction (ADF and NDF) of guava, tamarind, watermelon, orange, papaya and date seeds and the results of the study proved that how much scientific is the use of these type of nutrient dense fruit seeds in the feeding of cattle and poultry animals. Last but not the least, these seeds are easily available in our locality most of the time in a year and are not very costly. We may use these in household animal feed or in farms as feed and feed additive, to get better results. So it's our heartiest desire that all fruit processing industries should to start a by product business with these valuable ones which should be very much beneficial for industries as well as cattle and poultry farmers by nutritionally and economically. Moreover human life depends on animal life. So if animals grow healthier then human stay better.

MATERIALS AND METHODS

All six fruit seeds – guava (*Psidium guajava*), tamarind (*Tamarindus indica*), watermelon (*Citrullus lanatus*), orange (*Citrus sinensis*), papaya (*Carica papaya*) and date (*Phoenix dactylifera*) seeds were collected from local market and whole fruits were also purchased.

Preparation of Materials: The fruit seeds and whole fruits were collected from the local market. In case of whole fruits, the seeds were taken out considering safety concern. All seeds (six different fruit seeds) were sun dried and then dried in hot air oven for 8-12 hours at 100-102^{o} C. These seeds were powdered by grinder. Different analytical experiments were conducted in the food science laboratory of Biochemistry and Nutrition Department, AIIH & PH and Animal Nutrition Department, WBUAFS on the dry matter (DM) basis of each sample.

Chemical Analyses (Proximate compositions): Moisture content (%), crude protein [(N x 6.25 (%)], ether extract (%), crude fibre (%), total ash (%) and acid insoluble ash (%) were determined according to AOAC (2000) while NFE (Nitrogen free extract) was calculated by subtraction.

Mineral content: Calcium content (%) was determined by using Talapatra method (Talapatra et al., 1948).

Fibre fraction : Cell wall constituents (%) or neutral detergent fibre and cell content (%) were determined by the method developed by P J Van Soest (Van Soest, 1963).
Acid detergent fibre was also estimated by the method developed by P J Van Soest and R H Wine (Van Soest and Wine, 1968).

RESULTS

Proximate compositions (%) of tested fruit seeds: Table 1 shows the proximate compositions of tested seed flours. From Table 1 it could be observed that there were significant ($p<0.05$) differences among the studied seed flours in their contents of crude fibre, crude protein, ether extract, NFE, ash and moisture. Regarding crude fibre, guava and date seeds contained higher level of crude fibre than others. Among the tested fruit seeds watermelon and tamarind seeds contained very good amount of crude protein. Also from the same table (Table 1) it could be observed that orange seeds contained highest level of ether extract and tamarind seeds contained highest level of NFE. Regarding moisture content, watermelon seed flour contained lowest amount of moisture and guava seeds contained lowest level of total ash content.

Mineral content (%) of tested seeds: Table 2 presents the mineral content of tested seed flours. Only tested mineral was calcium. Regarding this mineral orange, papaya, date seed flours contained higher amount of calcium when compare with others (Guava, tamarind seeds).

Fibre fraction content (%) of tested seeds: Table 3 represents the fibre fraction content of tested seed flours. Regarding ADF content guava and date seed flours contained highest level of ADF than other

tested seeds. Among six fruit seeds flours NDF content was higher in date, watermelon, guava, tamarind seeds respectively than others. The highest level of cell contents was in orange seeds and lowest in guava seed.

Table 1. Proximate compositions (%) of tested seeds

Parameters	Chemical compositions (%) of tested seed powders (on dry mater basis)					
	Guava seeds	Tamarind seeds	Watermelon seeds	Orange seeds	Papaya seeds	Date seeds
Moisture (%)	10.34	10.62	8.70	11.71	7.73	8.56
Total ash (%)	2.34	2.49	3.11	2.85	5.97	1.09
Acid insoluble ash (%)	3.73	0.53	1.40	0.15	1.84	0.33
Crude fibre (%)	59.2	8.46	14.84	4.62	6.33	45.08
Crude protein (%)	7.5	22.74	30.22	4.62	30.00	7.18
Ether extract (%)	14.24	5.67	26.72	29.61	18.35	8.33
NFE (%)*	5.66	60.64	25.11	46.60	31.32	29.76

*Nitrogen free extract was calculated by subtraction

Table 2. Mineral content (%) of tested seeds

Parameter	Mineral content (%) of tested seed powders (on dry mater basis)					
	Guava seeds	Tamarind seeds	Watermelon seeds	Orange seeds	Papaya seeds	Date seeds
Calcium (%)	0.52	0.25	0.27	1.57	1.25	1.06

Table 3. Fibre fraction content (%) of tested seeds

Parameters	Fibre fraction content (%) of tested seed powders (on dry mater basis)					
	Guava seeds	Tamarind seeds	Watermelon seeds	Orange seeds	Papaya seeds	Date seeds
ADF (%)	69.29	22.85	38.33	37.60	58.77	64.74
NDF (%)	90.15	89.18	96.11	55.52	78.78	97.79
Cell contents (%)	9.85	10.82	3.89	44.48	20.22	2.21

DISCUSSION

With the aim of determination of proximate compositions of selected fruit seeds available in West Bengal were categorised in different parameters i.e. chemical composition, mineral content (calcium) and fibre fraction.

In one study by Samia El-Safy *et al*. (2012) it was observed that guava seeds contained 4% moisture whereas present study showed 10.34%. This variation may occur due to growing pattern of fruits and quality or type of fruit seeds. Other parameters were agreed with the previous study (Samia El-Safy *et al*., 2012). In another study (Uchôa-thomaz *et al.,* 2014) guava seeds contain 11.19% crude protein which was more than the studied amount i.e. 7.5%. There are no remarkable variation was found in chemical compositions of tamarind seeds flour in both present and previous studies conducted by Linda *et al.* (2014) and Samia El-Safy *et al*. (2012). The crude fibre percentage (14.84%) in watermelon seeds flour was very higher than previous study of Samia El-Safy *et al*. (2012). In case of ether extract content of same seed flour some variation was noted. Present value is 26.72% whereas previous study (Samia El-Safy *et al*., 2012) was 36.05 %. In another study (Umar and Shuaibu, 2013) it was observed that watermelon seeds contained 4.8% moisture, 10% ash, 3.3% crude fibre whereas in present study watermelon seeds contain 8.70% moisture, 3.11% ash and 14.84% crude fibre. So there is wide variation in result among these parameters with earlier studies. It may due to climate of the countries or quality of the seeds. The value of ether extract as obtained from orange seeds flour (29.6 %) and papaya seed flour (18.35 %) is much lower than previous study (Samia El-Safy *et al*., 2012). The value of ether extract from other parameters was very much close with previous study (Samia El-Safy *et al*., 2012). Chemical compositions of date seeds flour was very much similar with previous study (Heuze *et al.*, 2015).

Considering the mineral content (%) of seeds it was observed that orange seeds flour contained highest amount of calcium. So, this seed flour may help for better growth of bone and muscle of poultry and cattle animal.

The flour of guava seeds and date seeds contained highest percentage of both NDF and ADF amongst the six fruit seeds. So, these flour are rich in insoluble fibre which is helpful for better digestion of poultry and cattle animal.

In brief, the present study gives us some new extremely nutrient dense food additives which may very much helpful for growing of poultry and cattle animal. Also a new horizon may open for food and fruit processing industries in West Bengal.

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