*Agriculture Update*
Volume **12** | TECHSEAR-8 | 2017 | 2171-2177
**Visit us :** ***www.researchjournal.co.in***

**A REVIEW:**

# Value added products of guava

**K. USHA KUMARI, G. RISHITHA, K. RAJENDRA PRASAD AND P. SURESH KUMAR**

**ARTICLE CHRONICLE :**
**Received :**
*20.07.2017;*
**Accepted :**
*16.08.2017*

**SUMMARY :** Value addition favours the availability of guava beyond the seasons, geographic areas and provides consumers with innovative and convenient products. Guava is very popular as a fresh fruit because of its excellent taste, high vitamin content and 100% edibility. This fruit is equally important for the processing industry. Several advanced technologies have been developed in guava for value addition and there is immense scope for diversified value added products of guava. Due to presence of rich amount of pectin, a high quality natural jelly is obtained from guava. Processed guava pulp is an excellent raw material for preparation of various other guava products. Guava juice, blended RTS beverages, Guava wine, Guava powder, jam, toffee. Cheese, ice cream topping, nectar are some important products of guava.

**How to cite this article :** Kumari, K. Usha, Rishitha, G., Prasad, K. Rajendra, Kumar, P. Suresh (2017). Value added products of guava. *Agric. Update*, **12** (TECHSEAR-8) : 2270-2276; **DOI: 10.15740/HAS/AU/12.TECHSEAR(8)2017/2270-2276.**

**KEY WORDS:**
Guava, Value added products, Processing

## BACKGROUND AND OBJECTIVES

Fruits and vegetables are major source of vitamins and minerals. Even though India is the second largest producer of fruits with an annual production of about 45 million tonnes, the per capita availability of fruits even with this increase is lower at 107g/day than the recommended level of 120g. In spite of the India's strong hold on the production of fruits it is alarming to know that India processes just 2% of the total fruit production with an alarming loss of around 35% only 20% of the production of processed fruits is being exported. Karwasra *et al.* (1997), reported that post harvest losses in fruits and vegetables in India is worth about Rs.4000 crores annually. In general physical terms, post harvest losses in these commodities vary from 9 to 40%. India's share of global exports of fresh fruits and processed fruit products is quite meagre when we compare the same with other major fruit producers of the world (Bung, 2012). The reasons for post harvest losses are improper handling, packaging, and transportation and processing.

Among the fruits, guava is an important fruit crop cultivated widely in most parts of India and is one of the richest sources of vitamin C. Guava is available in rainy and winter seasons and the quality of rainy season fruits is inferior. Due to inappropriate handling, transportation and processing 20-25% of guava fruit is totally spoiled before reaching

**A**uthor for correspondence :
**K. USHA KUMARI**
College of Horticulture, Dr. YSR. Horticultural University, Venkatramannagudem, WEST GODAVARI (A.P.) INDIA
Email : ushahrs@gmail.com
See end of the article for authors' affiliations

the consumer. Consequently, the upgrading of low price processing technology of guava is extremely needed, to use the produce at the time of surplus and to save it from spoilage. About 10-15% of the total production of fruit is wasted from picking to the end user. It was also explained that about 4% of the production is decreased due to the imperfect collection, mechanical damage, harvesting unripe fruits and inappropriate packing, while about 3% was lost owing to substandard methods of transport, and negligence (Nida *et al.*, 2016).

These losses of the seasonal surplus of the guava fruit can be avoided by processing and preserving the fruit into different value added products like guava juice, pulp, nectar jam and jelly, wine, toffee as well as being used as an additive to other fruit juices or pulps (Leite *et al.* 2006). With the changing consumer attitudes, demands and emergence of new market products, it has become imperative for producers to develop products, which have nutritional as well as health benefits. In this context, guava has excellent digestive and nutritive value, pleasant flavour, high palatability and availability in abundance at moderate price. It is a very popular fruit and it is available throughout the year except summer season. The nutritive value of the fruit is very high thus is an ideal crop for the nutritional security.

Value added food products are raw or pre-processed commodities whose value has been increased through the addition of ingredients or processes that make them more attractive to the buyer and/or more readily usable by the consumer. The fresh fruit has limited shelf life therefore, it is necessary to utilize the fruit for making different products to increase its availability over an extended period and to stabilize the price during the glut season. These products have good potential for internal as well as external trade. In the present review, information was provided on different value added products of guava and its multipurpose commercial value. Processed products of fruit and vegetables have lot of export potential. During 2011-12 5.97 LT of processed products were exported with value 2818.1 Crores. (APEDA 2012). World Trade for the Processed Guava Products was likely to have a steady and significant increase. At present, the Products that were being Processed from Guava include; ascorbic acid (Vitamin C), canned slices, cheese, concentrates, dehydrated products, jam, jelly, juice, nectar, pectin, puree, spread, syrup and yoghurt. Purified and cloudy Guava juices had been currently produced and have a greater Market Potential. The Exports had picked up and had attained a spectacular level in 2007-08 with an Export Quantity of 393970 Kilograms from when it was 72800 Kilograms in 2001 (Shodh ganga)

**Value added products of guava :**

*Guava pulp* :

The guava fruits are highly perishable in nature and cannot be stored for more than a week in winter and 2-3 days in rainy season. Guava fruits can be processed and preserved in the form of pulps which can be converted into juice, ready-to-serve beverages, nectar *etc*. During off-season, Bottled guava pulp of cv. Allahabad Safeda and Banarasi Surkha stored at room temperature with 2000 ppm potassium metabisulphite (KMS) retained its highly acceptable quality up to 6 months after which it can be utilized for the preparation of ready-to serve drink and guava leather (Harsimrat and Dhawan, 2013).

The pulp is extracted from guava fruits by blending the cut pieces of fruits with water (up to 20 %) and filtering out the seeds. The pulp is heated to 75-78°C and stored with 1000 ppm S02 in airtight containers aseptically packaged. Guava pulp of good quality can be preserved with potassium metabisulphite and stored in food grade plastic jars at low temperature (2-5°C) for 3 months. (Harsimrat and Dhawan, 2013). Guava pulp is used for ethanol production (Srivastava *et al.*, 1997)

*Guava juice* :

Juice may be obtained either from fresh guava fruits or stored pulp. Juice from fresh fruit is extracted by squeezing guava pieces through a hydraulic filter press. Juice could be made from pulp by diluting it with water and filtration. Guava juice could also be blended with other fruit juices like pear, apple, mango, *etc*. Fruit juices are usually cloudy, colloidal suspensions. Manufacture of clear juice, from guava and many other tropical fruits is difficult. The colloidal particles which cause turbidity in the juices carry flavour substances and natural antioxidants. The fruits also have a large content of carotenoids which are retained in the structural tissue during pressing. The use of pectic enzymes in association with fining agents in fruit processing is essential to get better juice yields, improve filtration rate and produce clear juices of high quality for the concentration process

(Isabella *et al.*, 1995).

The use of enzymes to maximize the yield of cloudy juice and promote clarification is uncommon in the production of guava juice. Commercial preparations containing pectinases, arabinase and cellulase may benefit guava juice production. Pectinase assists in pectin hydrolysis, which causes a reduction in pulp viscosity and a significant increase in juice yield. Arabinase and cellulase convert araban and cellulose to soluble sugars that increase the soluble solids (SS). Arabinase also assists in eliminating the turbidity of juice caused by araban, which is visible only after 3-4 weeks of storage. (Askar *et al.* 1992).

Yield of cloudy juice is significantly affected by the temperature and time used for enzyme treatments. Increasing exposure time elevates yield but also causes a reduction in ascorbic acid content of the juice due to oxidation (Imungi *et al.* 1980).

For clarifying guava juice (600 ppm of pectic enzyme; 45°C during 120 min in association with fining agents: silica sol and gelatin) showed good results with juice yield of 84.70%. The product showed good stability in regard to the chemical and physico-chemical changes during processing that could affect nutritional and organoleptic characteristics. (Isabella *et al* 1995). The commercial enzyme Pectinex Ultra SP-L® at 700 ppm with incubation period 1.5 hr and at temperature 50°C was successfully applied to guava puree that resulted in a 51% reduction in viscosity, 13% increase in ascorbic acid content and 18% increase in yield of a clearer juice.

In terms of clarity, guava juice prepared using Ultra Filtration was clearer with 89.6% transmission, as compared to 82.8% for plate and frame filtered juice. However, plate and frame filtered juice retained more soluble solids, contained 5.8% more ascorbic acid than the UF juice and had higher flux rates at all times (Chopada and Barrett 2001)

*Blended RTS beverags* :

Guava (*Psidium gujava* L.), is a good source of vitamin_-C, has a strong flavour and taste with good nutritional quality but fruit pulp is not attractive in colour. Hence it is used to prepare RTS beverages blending with other fruit pulps like 20% Aonla pulp (Poonam and Tondon, 2007), 30% papaya, Tiwari (2000) and dairy products.

Whey based beverages are prepared by utilizing dairy waste. Carbonation enhanced the storage stability. Finished guava beverages contained13% total solid and 25-30mg VitaminC, when compared to plain guava beverages (Pritam chandra). Whey or milk serum and guava beverage is prepared in a ratio of 67.5:20 (%) as it gave good colour, flavor, aroma, taste mouth feel and overall acceptability. (F.M.Bhat & R.Singh 2014).

Jakhar *et al.,* 2013 studied the suitable blending of guava and Barbados cherry pulps to prepare RTS beverages. Blending 50% Guava and 50% Barbados cherry pulps with 12% TSS and 0.2% acidity was found to be the best. They also reported that blended RTS was found to be acceptable up to five months of storage at ambient temperature with good appearance, flavour, taste and overall acceptability.

Pink varieties are better suited for beverage preparation, owing to their attractive colour. From 100 kg of red flesh guava, 247 litres of RTS beverage could be obtained. The cost:benefit ratio and value addition from this process were worked out at 1.79 and Rs. 5.45/ kg of fruit, respectively.(Bhuvaneswari and Tiwari 2007).

*Guava nectar* :

Guava nectar is a juice made from the guava fruit. It is typically made by crushing fresh guava fruits and using the resulting guava pulp to create a rich, sweet juice which has a great deal of flavor. There are a number of uses for guava nectar, ranging from mixed drinks to straight consumption, and the beverage is especially popular in tropical regions. It can be found for sale in many markets, often in pasteurized and shelf-stable forms. Specifications for Guava Nectar are Brix 12.5° - 13 ° Acidity 0.15 %, pH 3.4 – 4 (Azra Yasmin).

The effect of processing and storage time on the vitamin c and lycopene contents of nectar of pink guava was studied. The production of nectar from fresh guava reduced titrable acidity, lycopene and vitamin C while pH and soluble solid increased significantly. Studies showed that guava nectar storage at 10°C retained 46% of the content of vitamin C for 120 days. (Nida *et al.*, 2016).

*Jelly* :

Jelly is the major product prepared from fresh guava fruits. For the preparation of jelly, slightly under ripe fresh guava fruits are used. Jelly is a semi-solid product prepared by boiling a clear strained fruit extracts free

from pulp after the addition of required amount of sugar, citric acid and pectin. It should contain minimum 65per cent of total soluble solids and minimum 45 per cent of fruit portion (Dhawan, 1998). The jelly should have an attractive purplish-red colour, pleasant aroma and good taste.

Paul *et al* 2007 stated that Jelly quality is dependent on variety, physical properties like fruit weight and biochemical properties like non reducing sugars, acidity, pulp weight and core weight. Pectin changes the colour, taste and overall acceptability of the jelly at prolonged storage (30-90days). Fruit jelly prepared with guava extract and carrot juice ratio of 75:25was found to be superior (Singh and Chandra, 2012).

**Toffee :**

Pulpy fruits like mango, guava, papaya, fig, jackfruit etc. can be utilized for preparation of toffee. Fruit toffees naturally are very nutritious as they possess most of the constituents of fruit from which they are prepared.

Better quality toffee with fig and guava pulp can be prepared by using 75:25 per cent pulp, 500 g sugar, 50 g skim milk powder, 100 g fat (cow ghee) and 2 g common salt per kg pulp. The storage studies of toffees packed in 200 gauge polyethylene bags indicated that the TSS, reducing and total sugars increased with the advancement of storage period, while moisture and acidity content decreased. Toffee could be stored in good condition beyond 180 days at ambient temperature (Kohinker *et al.,* 2014).

The toffee containing 90 per cent of noni pulp with 10 per cent of papaya pulp and 93 per cent noni pulp and 7 per cent guava pulp was found to show significantly higher overall organoleptic acceptability (Jadhav *et al.,* 2012).

Guava-soya toffees are prepared by blending guava pulp with soya slurry for developing protein enriched product. With increase in concentration of soya, the level of protein and fat in the finished product was observed higher as a result of which the concentration of sugars decreased in the final product. Addition of guava increased the level of ascorbic acid, fibre, calcium and phosphorus. However, the product having 85% fruit pulp and 15% soya slurry recorded highest score in sensory attributes revealing better consumer acceptability. Thus, guava fruit being highly perishable and deficient in protein and fat can be utilized by blending with soybean products to yield a nutritious product (Khapre, 2010). The various parameters of quality and over all acceptability were found in the treatment combination of 40% guava and 60% papaya along with 300 g sugar, 50 g milk powder and 120 g butter (Harnam *et al.,* 2013).

**Guava wine :**

It was noted that guava fruit can also be converted into wine of acceptable quality. Wine from 1:4 dilutions with DAHP was found to be the best treatment and graded as fair however it s quality is lower than standard grape wine (Shankar *et al* 2006).

**Guava leather :**

A number of products are prepared from fruits but leathers are popular due to their convenience in handling and transportation. The increasing demand of fruit and vegetable products has resulted from rising standards of living, the desire for a more diversified diet throughout the year, expanding urbanization and an increase in population (Saxena and Arora, 1997). Guava leather is prepared by dehydrating fruit puree into a leathery sheet. Leathers can be consumed as a confection or cooked to give a sauce. There is a dearth of information on the chemical and organoleptic properties of guava leathers in the tropics. Studies are conducted on preparation of guava and pawpaw leathers and evaluated the chemical and organoleptic properties of the products. Higher protein and fat content was found in guava leather. This was also observed in the ash contents with pawpaw leather having (2.67%) and guava leather (2.87%). Studies indicated that guava leather is significantly higher in fruitiness smell and overall acceptability and showed better compositional attributes. (Nida *et al.,* 2016).

Guava leather was prepared from guava pulp extracted by heat process and addition of sugar, citric acid and 750 ppm KMS to the pulp and drying in the cabinet drier at 60±2°C. For the storage of product the optimum RH was found to be 60 per cent and the critical and danger points were found to be 11.26 and 8.40 per cent moisture level, respectively. The product was acceptable up to 9 months when it was stored in 200 g polyethylene bags at 17-34°C (Sagar and Suresh kumar 2007).

**Guava dehydrated slices :**

Ready-to-use dehydrated guava products such as dehydrated guava slices can be prepared from firm and

ripe guava fruits. The osmo-dried guava slices were prepared after cutting guava fruits into 1.5 cm thick slices cored and dipping in different concentration of sugar syrup solution containing 0.05 per cent KMS and 0.1 per cent citric acid for varying time period and temperature. The results indicated that water loss and solid gain increased with the increase in sugar concentrations and temperatures of the solution during osmosis process. The optimum solid gain (13.1%), water loss (34. 2%) and mass reduction (21.1%) in slices were recorded in 60°B sugar solution at 60°C temperature. Osmotic drying considerably increased sugar content and reduced acidity without any significant changes in colour, texture and original flavour of the slices. (Sagar and Kumar, 2007).

Guava in syrup is the product maintaining the original shape and appearance of the fruit. Such a process consists of soaking the fruit in syrup at high temperatures for a pre-determined period. The high sugar concentration of the syrup reduces the water activity (Aw), enhancing product shelf-life. The effect of process temperature and calcium concentration in the cooking syrup of guava was studied. All of the processed guava quality parameters were compared with those of the fresh fruit and of a commercial sample to evaluate the effects of processing on the final quality of product. (Nida *et al.*, 2016).

*Guava cheese* :

Better quality cheese is prepared from fresh fruits rather than the left over pulp from jelly preparation.

*Guava powder* :

Guava powder is obtained by dehydration process which is an efficient alternative for storage of fruit. It may be obtained by pulverizing the dehydrated slices/ pieces after removing the seed core, if any. Guava powder can be used for the preparation of beverages, mild shake, etc. The total ascorbic acid content in guava powder ranged from 459.33 to 1,229 mg/100 g of powder. Guava powder is rich source of phenolic compounds (44.04 mg GAE/g) (Verma *et al.*, 2013).

There is also potential for use of an instant guava powder in formulated drinks, baby foods and other products. Several methods may be used for production of guava powder, but the most successful include freeze-drying, foam mat drying, spray drying and tunnel drying. Guava powder can be used as a source of antioxidant dietary fibre in sheep meat nuggets, without affecting their acceptability. Incorporation of guava powder could protect cooked sheep meat nuggets against lipid oxidation during refrigerated storage. Incorporation of guava powder significantly affected the physicochemical properties of the products. Most significant effect of guava powder addition in sheep meat nuggets is enrichment of the products with dietary fibre and phenolic compounds. Guava powder improved the redness value of the product thus its appearance. Incorporation of guava powder up to one per cent level did not affect products organoleptic attributes (Verma *et al.*, 2013).

**Guava processed waste utilization :**

The Guava industry provides a variety of processed products, such as beverages, syrup, ice-cream, jams, jellies, toffee, juice, and dehydrated and canned products. Since the worldwide production of guava is estimated at about 500,000 metric tons, considerable amounts of waste from this industry are also generated and simply discarded to the environment. Utilisation of these wastes helps to solve pollution problems related to its disposal.

Guava pomace is an example of the processing waste generated and represents up to 15% of the original fruit. After the manufacturing process from the juice industry that could be a source of bioactives. Guava pomace extract, showed anti-inflammatory activity by carrageenan, dextran, serotonin, histamine-induced paw edema and neutrophils migration (Denny *et al.*, 2013)

**Guava pectin :**

Pectin is a naturally occurring substance present in all plant tissue, calcium pectin being present between the cell walls and serving as a strengthening or building agent. It is very widely used in food and food processing industries. For example, it is used in preparation of jam, jelly, sauces, pickles, ice cream, and confectionary.

It is being observed that maximum pectin yield is obtained (0.09%) for spent guava extract at 80°c as compared with lime peel and apple pomace. So according to experimental studies spent guava extract was found to be most suitable for pectin extraction. Finally the extracted pectin is used to formulate various types of processed fruit products and others e.g. jelly, jam, marmalade, synthetic jelly, thickener and stabilizer etc. (Chakraborty and Ray 2011).

**Conclusion :**

Consumers are more and more concerned with food of high nutritional quality providing health benefit, such

as fruits. India produces around 237 million tonnes of fruits and vegetables out of which 35.58 million metric tonnes is wasted. India can become one of the largest fruit and vegetable exporters in the world and can equally be a large importer given its demographic diversity. This strong footing in agriculture provides a large and varied raw material base for food processing. Present processing companies have the utilisation capacity of 3.38 million tonnes only. Therefore, it is evident that there is lot of scope for setting up processing industries. Utilisation of value addition technologies processes of by-product utilisation and available machinery would not only reduce the post harvest losses but also increase the percentage of employment which is currently 29% in food processing industries. Guava is one of the best crops suited for value addition. Guava shares 3.5% of total fruit production. Several advanced technologies have been developed in guava for value addition and there is immense scope for diversified value added products of guava. Development of low cost processing technologies, value addition through extension of shelf life and processing of marketable surplus into value added products, utilization of food industries waste/ by products are the key areas to be focussed to increase the share of value added products in Indian exports.

Authors' affiliations :

**G. RISHITHA,** College of Horticulture, Dr. YSR. Horticultural University, Venkatramannagudem, WEST GODAVARI (A.P.) INDIA

**K. RAJENDRA PRASAD,** Horticulture Research Station (Dr.Y.S.R.H.U.), Pandirimamidi, Rampachodavaram EAST GODAVARI (A.P.) INDIA

**P. SURESH KUMAR,** National Research Centre for Banana, TRICHY (T.N.) INDIA

## REFERENCES

**Askar, A.,** El-Samahy, S.K. and Abd El-Salem, N.A. (1992). Production of Instant Guava Drink Powder. *Confructa-Studien.* **36** (5-6) : 154-161.

**Abhijit Chakraborty** and Subhajit Ray (2011). Development of a process for the extraction of pectin from citrus fruit wastes *viz.*Lime peel, Spent guava extract, Apple pomace *etc*. *Internet. J. Food Safety.* **13** : 391-397.

**Bhat, Farhan Mohiuddin** and Singh, Rongen (2014). Preparation, quality evaluation and shelf life studies of whey-guava beverage ISSN 1817-3047. *World J. Agril. Sci.,* **10**(3) : 141-145.

**Bhuvaneswari, S.** and Tiwari, R.B. (2007). Pilot scale processing of red flesh guava RTS beverage. *J. Hort. Sci.,* **2**(1) : 50-52.

**Bung, Purushottam** (2012). Indian Fruit processing Industry Import and Export Analysis. *A J. MP Birla Institute Mgmt.,* **6**(2) : 72-86.

**Denny, Carina,** Priscilla S. Melo, Marcelo Franchin, Adna P. Massarioli, Keityane B. Bergamaschi, Severino M. de Alencar and Pedro L. Rosalen (2013). Guava pomace: a new source of anti inflammatory and analgesic bioactives. *BMC Complementary and Alternative Medicine: The official J. Internat. Soc. Complementary Medicine Res.,* **13** : 235.

**Dhawan, S.S.** (1998). Practical Manual on Home-scale Processing of Fruits and Vegetable.

**Harnam, Mewada**, Jain, M.K. and Barche, Swati (2013). Physiological and biochemical evaluation of guava papaya mixed fruit toffee. *Internat. J. Horticul.,* **3**(3) : 11-15.

**Harsimrat, K. Bons** and Dhawan, S.S. (2013). Studies on preservation of guava pulp**.** *Indian J. Hort.,* **70**(3) : 452-454.

**Isabella, Montenegro Brasil,** Gerald Arraes Maia and Raimundo Wilane de Figueiredo (1995). Physical-chemical changes during extraction and clarification of guava juice. *Food Chem.,* **54**(4): 383-386.

**Imungi, J.K.,** Scheffeldt, P. and Saint-Hislare, P. (1980). Physicachemical changes during extraction and contraction of clear guava juice. *Lebensmit. Wiss Technol.,* **13** : 248-251.

**Jadhav, B.A.,** Joshi, A.A., Chilkawar, P.M. (2012). Effect of varrying pulp concentration on sensory quality of noni (*morinda citrifolia l.*) - toffee blended with papaya and guava pulp *Carpathian J. Food Sci. & Technol.,* **4**(2) : 36-39.

**Kohinkar, S.N.,** Chavan,U.D., Pawar,V.D. and Amarowicz, R. (2014). Studies on preparation of mixed fruit toffee from Fig and Guava fruits. *J. Food Sci. Technol.,* **51**(9) : 2204-2209.

**Khapre, A.P.** (2010). Standardization of technology for development of guava – soybean toffee as a protein enriched product. *Food. Sci. Res. J.,* **1**(2) :154-156.

**Nida, Kanwal,** Randhawa, Muhammad Atif and Iqbal, Zafar (2016). A Review of Production, Losses and Processing Technologies of Guava. *Asian J. Agric. & Food Sci.,* **4**(2) : 19.

**Poonam, Mall** and Tandon, D.K. (2007). Development of Guava-Aonla Blended Beverage Proc. I$^{st}$ IS on Guava Eds. G. Singh *et al. Acta Hort.* **735** : 555-560.

**Sagar, V.R.** and Suresh Kumar P. (2007). Processing of guava in the form of dehydrated slices and leather Proc. I$^{st}$ IS on Guava Eds. G. Singh *et al. Acta Hort.* **735** : 579-585.

**Saxena, R.** and Arora, V. P. S. (1997). Consumers preference of processed fruit and vegetable products. An analysis of buying behaviour. *Indian Fd. Industry,* **16**(2) : 25.

**Shankar, S.,** Dilip Babu, J. and Narayana Reddy, Y. (2006). Fermentation of guava pulp with grape-grown yeast (Saccharomyces cerevisiae var. ellipsoideus) for wine production. *Indian J. Hort.*, **63**(2) : 171-173.

**Singh, Jaydeep** and Chandra, Suresh (2012). Preparation and evaluation of guava-carrot jelly. *Internat. J. Food. Ferment. Technol.*, **2**(2) : 197-200.

**Srivastava, Suchitra** and Modi, D.R. and Garg, V.K. (1997). Production of ethanol from guava pulp by yeast strains *Bioresource Technol.*, **60** : 263-265.

**Tiwari, R.B.** (2000). Studies on blending of guava and papaya pulp for RTS beverage. *Indian Food Packer,* **54**(2) : 68-72.

**Verma,A.K.,** Rajkumar,V., Rituparna Banerjeel, Biswas, S. and Arun K Das (2013). Gauva (*Psidium guajava* L.) Powder as an Antioxidant Dietary Fibre in sheep Meat Nuggets. *Asian Australas. J. Anim. Sci.*, **26** : 886-895.

## WEBLIOGRAPHY

**Chetan, A.** Chopda and Diane M. Barrett (2001). Optimization of guava juice and powder production. *ucce.ucdavis.edu/files/datastore/234-250.pdf.*