

## **A Survey on Guava Farming and Utilization in Kenya**

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### **Abstract**

The guava tree is broadly developed in the tropical and sub-tropical districts of the world. It is very versatile, profoundly profitable, has high financial returns and requires insignificant consideration. The organic product is extremely nutritious with a trademark season and has a popularity universally particularly when handled into a mesh, concentrates, prepared to serve refreshments, wines, just as jams and jams. Despite the fact that Kenya has a positive atmosphere for guava cultivating, the natural dietary products and financial potential remain exceptionally underutilized because of low reception of processing and preservation strategies notwithstanding constrained research. This survey centers around guava production, utilization, processing and preservation with accentuation on Kenya. There has been dynamic increment in the total real estate under guava cultivating with different assortments of guavas being delivered. The nation delivers as much as 11,327 tons of guava natural products worth 1.1 million US dollars in spite of the fact that the organic product is basically developed for nearby utilization with insignificant preparing. Naturalized guavas from sprouts of haphazardly scattered seeds are normal over all the agro-ecological zones both in the wild and on ranches with the exception of in the dry territories. The natural product is that as it may, climacteric and has a high pace of perishability coming about to high post-harvest misfortunes when in season. Preparing of guavas into business items can increase the organic product's worth, improve farmers' family unit salaries and upgrade their usage.

**Key words:** Guava, Kenya, Preservation, Processing, Post-harvest

### **Introduction**

Guava is a little monoecious evergreen tree with a stature of among 2 and 10 meters having a place with the fruits family[1]. It is local to tropical territories of Southern Mexico furthermore, Northern South America in spite of the fact that guava trees have now been developed by numerous different nations having tropical and subtropical atmospheres, in this way permitting generation around the world[2]. The variety guava comprises of around 150 genera also, around 5000 species which are broadly dispersed in the American, Asian and African tropics[3]. The natural product which develops in roughly 120 days after blossoming, is meaty with a trademark smell and smell, contains numerous seeds and can weigh up to 500g relying upon the assortment and the earth[4]. The guava tree is very versatile, exceptionally gainful, requires insignificant consideration and has high monetary returns[5]. The guava is broadly circulated owing to its capability to adjust well to different biological conditions incorporating badlands and soils with a lot higher pH levels and it surpasses most other organic product trees in profitability, strength what's more, flexibility as they are

effectively naturalized[6]. The scattering of guavas has effectively been through operators including flying creatures, bats, man and other creatures[7].

Business guava production includes utilization of improved guava assortments through different procedures mostly proliferations from seeds and vegetative proliferations for business purposes[8]. In any case, business guava development in East Africa is constrained with normally developing guavas being the most widely recognized coming about to guavas with assorted morphological and hereditary decent variety[9]. Guava organic products are regularly expended crisp but on the other hand are appropriate for processing into jam, juice, nectar, wine furthermore, organic product cowhide among other products[10]. The natural product is exceptionally nutritious and is a decent wellspring of vitamin C, vitamin A, sugars, proteins, minerals, gelatin, calcium and phosphorus among different supplements and can hence help battle lack of healthy sustenance. Furthermore, the guava plant has been generally utilized in Central and South America, West and North Africa and a few portions of South East Asia for treatment of different infirmities including, gastrointestinal aggravations just as applications in the corrective and dermatological industry. This audit paper centers around giving data on guava production, usage, preservation and preparing in connection to Kenya dependent on writing discoveries.

## **Literature Review**

### **1. Guava Cultivation in Kenya:**

Natural product production remembering guavas for Kenya is chiefly done by farmers with lacking assets exceptionally thwarting organic product species experimentation furthermore, enhancement. Different assortments of red/pink fleshed, white fleshed and strawberry guava with different morphological and hereditary assorted varieties develop in Kenya due to the diverse agro-biological zones in the nation. Naturalized guava development is very basic in provincial zones over all the agro-natural locales both in the wild and on ranches aside from in the parched areas. The guava trees develop broadly with insignificant care from sprouts of haphazardly scattered seeds as per the Farming Crops Directorate. There has been expanded guava production throughout the years in the nation agreeing to HCD information. The absolute real estate under guava cultivating was assessed to be 1260 - 1806 Ha from 2014 to 2016 and an anticipated increment underway in the ensuing years. The total production was evaluated at more than 9800 - 11,327 tons. Anyway due to low financial worth, the guava costs have poor comes back to farmers coming about to high post-harvest misfortunes. The guava esteem chain along these lines remains broadly undiscovered in spite of its healthful centrality furthermore, monetary potential.

Guavas in Kenya are predominantly expanded at family level and there is constrained innovative work planned for training and commercialization of the organic product which have frustrated the foundation furthermore, improvement of organized guava esteem chains in Kenya. Moreover, there are dissipated and clashing data on the guava generation just as extremely restricted documentation on the advancement programs for the harvest. There is

additionally restricted data on guava production for utilization and business purposes just as absence of documentation of known guava ranches in Kenya. In addition, the guava assortments and their execution in the nation are yet to be profiled as negligible investigations identified with the yield have been directed. Therefore, the climatic, soil and agronomic conditions for ideal guava development just as guava post-harvest processing innovations in the nation are not recorded. Sub-Saharan Africa Kenya included is portrayed by essentially high paces of small scale supplements lacks and ailing health because of constrained access what's more, usage of products of the soil and just as moderately elevated level of destitution prompting nourishment and nourishing uncertainty particularly in the rustic regions. In addition, there are high post-harvest misfortunes as selection of post-harvest advancements stays low in this manner adding to expanded destitution and shrouded hunger. Guava esteem expansion in Kenya remains incredibly low and in this way there is need for an organized framework for strategy plan centered on its exchange with a point of decreasing the post-harvest misfortunes, increment business open doors too as expansion of the organic products' an incentive to farmers. Value expansion through new items improvement while guaranteeing negligible demolition of supplements is fundamental in order to battle hunger particularly during the unforgiving climate conditions and can create salary that can be used to meet family unit nourishment security for the farmers through commercialization of guava foods grown from the ground handled items.

## **2. Nutritional Properties of Guava:**

Guava organic product is frequently devoured new. The organic products are berries comprising of meaty pericarps and seed depressions with meaty pulps and various little seeds. The organic product contains significant levels of vitamin C with the most noteworthy focus in the unpeeled natural products. Guavas likewise contain noteworthy degrees of fundamental oils, phenols, triterpenes, flavonoids, saponins, lectins, fiber and unsaturated fats just as gelatin. Moreover, the natural products have significant degrees of minerals including phosphorus, calcium, iron and vitamins, for example, niacin, pantothenic corrosive, thiamin, riboflavin and vitamin A. Guavas are wealthy in the two carotenoids and polyphenolic mixes which give the natural product its antioxidative shades making the natural product among the most noteworthy in antioxidation esteems. The shades are capable for the natural product's skin shading just as that of its substance. In that capacity, the red-orange hued guavas have been found to contain significant levels of the polyphenolic constituents, high carotenoids and professional vitamin A substances and retinoids contrasted with the yellow-green hued assortments.

The guava organic products additionally contains different constituents that have been appeared to have different medical advantages counting, oxalic and malic acids, saponin joined with oleanolic corrosive among other polyphenolic mixes including; morin-3-O- $\alpha$ -L-lyxopyranoside what's more, morin-3-O- $\alpha$ -L-arabopyranoside, flavonoids, guaijavarin and quercetin. In 2018 on Kenyan guavas demonstrated fundamentally low degrees of vitamin C contrasted with the USDA information going from 83-147 mg/100 g of new organic product.

The mineral piece additionally shifted essentially with a few assortments amazingly low or high when contrasted with the USDA information. The white-fleshed guavas for the most part had considerably more phosphorous, magnesium, sodium, what's more, boron contrasted with the red-fleshed assortments. These varieties were might be ascribed to the climatic conditions and the organic products' morphological characteristics just as the development levels and the farming rehearses. There is need along these lines for additional look into on the dietary organization of Kenyan guavas and components impacting the supplement substance.

### **3. Medical Advantages of Guavas:**

The guava plant's leaves and the bark have been broadly utilized in the treatment of different diseases. They have phytochemicals and common cancer prevention agents that have been appeared to counter incessant sicknesses as they has anticancer what's more, antidiabetic properties and in this manner diminish dangers of reaching and building up Alzheimer's sickness, age-connected maladies, avert liver wounds what's more, waterfalls due to their antioxidative and calming properties. Besides, the natural product has hepatoprotective impacts while the leaf removes have been utilized for quite a long time to treat different malady in ethnomedical rehearses because of their high levels of flavonoids predominantly quercetin. These incorporate loose bowels, nephritis, stomachache, wounds, anorexia, cerebral diseases, jaundice, dermatitis, epilepsy and delirium among others. The utilization of guava in ethnomedical rehearses in Kenya anyway remains obscure or in the event that it has been rehearsed, there appears to be no recorded writing on the equivalent.

The utilization of guava in restorative practices has been considered by a few different specialists on different ailments and it has demonstrated potential for treatment of most diseases over the world. The ethno-pharmacological evaluations, research center examines and clinical preliminaries have demonstrated that the guava is compelling in the treatment of these diseases. Besides, the poisonous quality appraisals of the plant's roots, bark, leaves, organic products, blooms and seeds have been seen as safe for therapeutic purposes for both oral and topical utilizations whenever regulated in mixtures and improvement structures. Be that as it may, further research should be directed so as to seclude useful fixings that can be utilized in creating of medications what's more, other remedial items.

### **4. Post-Harvest Losses of Guava Fruit:**

The guava natural product is a climacteric with a high pace of perishability. The primary post-harvest misfortunes in natural products happen through physiological procedures because of withering, shrinking and chilling wounds, pathologically as an aftereffect of parasites and bacterial assaults, and physically through mechanical wounds. Misfortunes have been evaluated at 20 to 40% in creating nations as contrasted with around 10 to 15% in created nations, contingent upon the yield in question and the season. Guavas, as different organic products have quantitative and subjective post-harvest misfortunes happening at all phases from harvesting, through taking care of, bundling and transportation, post-harvest

capacity also, during advertising. Be that as it may, utilization of appropriate post-harvest practices can help decrease this. Around 20-25% of guava natural products are harmed and unfit for utilization before they come to the shoppers. It is along these lines basic that improvement of moderate preparing innovation for guava are received. The guava post-harvest misfortunes in Kenya remain unaccounted for. This might be credited to the natural product not being considered as significant thought about to others, for example, mangoes and avocados. Besides, farmers infrequently plant the guava organic product as a pay generator thought about other natural product trees.

The pace of guava weakening is affected by different outer ecological variables that the harvested guavas are presented to including, encompassing temperatures, relative mugginess, velocity and the climatic air piece just as the clean states of capacity zone. By and large, new guavas keep going for around 3 – 10 days yet on the off chance that some of these components are controlled, the organic products can last 2 - 11 more days relying upon the assortments and techniques utilized. Guavas experience high breath rates and consequent post-harvest aging which prompts the organic product perishability. The pace of guava perishability has anyway been appeared to lessen fundamentally at the point when guavas are bundled in altered structures. It was accounted for that capacity of guavas at  $7\pm 3^{\circ}\text{C}$  after psychologist and stick wrapping utilizing polythene sacks diminished the aging rates and the physiological weight misfortunes and expanded the timeframe of realistic usability by as long as 15 days.

The utilization of salts, for example, calcium chloride and calcium nitrate has been found to expand the guava freshness also. This is expected to the balancing impact on ethylene, along these lines diminishing the maturing rates and broadening the guava life by as long as 12 days while putting away the organic products at room temperatures. The utilization of salicylic corrosive at low fixations have too been appeared to successfully decrease the pace of guava debasement while utilization of cell reinforcements such as benzyl adenine have comparatively expanded the guava timeframe of realistic usability by up to 14 days during capacity. Freeze-drying of guavas and guava mash has been used to protect the organic products. The system has been seen as the most fitting technique for drying items particularly products of the soil that are profoundly touchy to warm. Not at all like in traditional drying, freeze drying is completed at low temperatures that limits the contracting and corruption responses coming about to items with prevalent quality.

In Kenya and the sub-Saharan Africa when all is said in done, post-harvest misfortunes are brought about by numerous components what's more, come in various structures. Pre-harvest factors for example, sickness and creepy crawly pervasion are the significant cause. Different components that profoundly impact post-harvest misfortunes are; terrible and unpracticed treatment of natural products, poor bundling techniques which may prompt physical harms and high temperatures which lead to dampness misfortunes. Moreover, postponed advertising and poor market appropriation systems which expand the time among harvesting and utilization have frequently been appeared to contribute to post-harvest misfortunes also.

There has been restricted research on the post-harvest misfortunes of guavas in Sub-Saharan Africa due to constrained preparing however the misfortunes have been appeared to be as much as 49% as they are not considered to be significant natural products. The genuine post-harvest misfortunes of guavas in Kenya anyway might be amazingly high as there is no organized worth chain for the privately delivered natural products because of absence of showcasing and processing.

### **5. Processing Methods on Guava Fruit Vitamins:**

Preparing of guava into different items altogether influences the supplement substance of the natural product. These incorporate decrease of the warmth labile supplements for example, vitamin C which may decrease by to such an extent half or more relying upon the power and time of presentation to warm. The carbonyl mixes that give the natural product its trademark smell too as other phytochemical degeneration have been appeared to happen and are ascribed to the enzymatic exercises because of introduction to light and oxygen. In addition, cutting of guavas likewise advances ethylene generation which quickens the senescence forms and higher oxidase exercises just as lipoxygenase compound action prompting unsaturated fats furthermore, carotenoids oxidation.

Misfortunes of ascorbic corrosive have been appeared to happen by as much as 20.4 % and 62.5 % during juice and jam processing separately, 63% misfortune in vitamin C also, 61.9% in lycopene during nectar produce. Drying expands the guava timeframe of realistic usability with insignificant debasement of the natural product's mineral and antioxidant exercises. Be that as it may, freeze drying has been appeared to have minimal impact on guava drying out as it effect sly affects the supplement content levels just as the organic products' common shading, flavor and fragrance despite the fact that the strategy is very expensive. There are at present no information on the supplement substance of prepared guava items in the Kenyan markets also, these requires a need on directing investigations on them in order to determine the degree of supplement corruption in handled guava items.

### **6. Processing of Guava Squanders:**

Processing of guavas into different items results to squanders including seeds, stone cells and sinewy tissues from the skin are produced particularly during pulping. These make about 25% and are reasonable for preparing into creature encourages and other items. Guava squanders have been found to contain elevated levels of unrefined fiber, critical amounts of ether extricates and 1,336 kcal/kg - 1,808 kcal/ kg utilization vitality esteems. The minerals, counting zinc, iron, potassium, phosphorus and manganese are additionally present in noteworthy levels in guava seed dinner. Guava squanders can be handled into esteem included nourishment items as all things considered, including gelatin, dietary fiber that is acquired from ground dried squanders and powder which can be enhanced in pastry kitchen items to support the dietary fiber and utilization of the loss as substrate in aging for ethanol generation.

Consolidation of guava squanders in broiler chicken nourishes has been appeared to improve the corpse yields while it was indicated that consideration of about 20% of guava squanders in encourages can successfully be utilized without meddling with the creatures wellbeing, their presentation and edibility also, has unimportant impact on the cadaver quality. The utilization of guava squanders as bunny feed or incorporation in their eating regimens has been found to streamline on the expenses of feed and decidedly improves the development furthermore, soundness of hares with insignificant impedance in their assimilation and the corpse quality. Along these lines guava squanders could be prepared into business items and along these lines help diminish the contamination from dumping the squanders. The evaluated squanders created from the Kenyan businessesprocessing guavas have not been recorded. There is need in this manner for advancing guava processing and surveying the reasonableness of handled guava squanders from the Kenyan cultivars.

## **Conclusion**

The guava natural product's dietary and monetary potential stay unexploited in Kenya. More research on the variables restricting its full abuse should be done. In spite of the fact that the Kenya Farming and Domesticated animals Research Association has been in the front line in advancing guava generation through arrangement of guava seedlings to farmers, a multi-sectorial come closer from the other government bodies, strategy creators, farmers, processors and specialists ought to be set up so as to advance guava generation and preparing. It is significant that guava generation can be delivered in most regions the nation over and along these lines there may be need on teaching farmers on the natural product's latent capacity. Moreover, the included specialists ought to be in the front line in giving farmers the high caliber guava seedlings, completing augmentation administrations on legitimate agronomic practices for guavas and setting up showcasing channels simply like with other organic products, for example, mangoes. Additionally, basic preparing furthermore, protection strategies that should be possible at the family levels can be advanced through farmertraining bunches so as to limit the natural products post-harvest misfortunes while the legislature could likewise intercede so as to guarantee that organic product processors in the nation likewise produce and market guava items from privately sourced guava natural products.

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