



**SPECIFICATIONS FOR
FOOD SERVICES and FOOD MANUFACTURING**



Visit AmericanPistachios.org for Supplier Contacts

PISTACHIO KERNELS

Contact

AMERICAN PISTACHIO GROWERS
9 RIVER PARK PLACE EAST, SUITE 410
FRESNO, CALIFORNIA 93720-1530 USA
TEL: 559.475.0435 / FAX: 559.475.0624
E-MAIL: Info@AmericanPistachios.org
AmericanPistachios.org

Background

The pistachio tree (*Pistacia vera*) is native to western Asia and Asia Minor and was introduced to Mediterranean Europe in the first Century A.D. Pistachios are grown in areas with hot and dry climates in areas of Asia, Europe, Africa and the American West.

Although the majority of all pistachios are utilized as in-shell snacks, the use of pistachio kernels has been a tradition in food products for ages. Pistachio kernels are an important ingredient in Middle-Eastern confectionery such as sweet meats, bakery, and thousands of snack combinations. In North America, food processors are integrating pistachio kernels into high value baking, confectionery, snacks and other items.

The following information is designed to give food processors an understanding of the pistachio ingredients available. The most important link for further information is your ingredient supplier who can provide samples and technical advice. You may also contact any APG member processor.

Country of Origin

USA: California, Arizona, New Mexico

Composition¹

Raw, whole kernels without shell. (Edible portion only)
Information listed on this page is sourced directly from the USDA National Nutrient Database for Standard Reference, Release 23 (2010)

http://www.nal.usda.gov/fnic/foodcomp/cgi-bin/list_nut_edit.pl

Pistachios contain a wide range of vitamins and minerals.

- One ounce of shelled pistachios provides 10% or more of the Daily Value of protein, dietary fiber, vitamin B6, thiamin, manganese, phosphorus and copper.

Pistachio Food Processing Chemistry

Moisture Content: 2.5 - 6.0%

Ash: 2.91 - 3.55%

Crude Fiber: 1.74 - 2.19%

Water Activity: 0.75 or less

Specific Gravity: 0.930

Smoke Point: 350 - 355°F

pH: 6.4

¹USDA National Nutrient Database for Standard Reference, Release 23 (2010)



PISTACHIO KERNELS



Storage & Handling

Like all tree nuts, pistachio kernels require cool storage conditions to protect freshness.

Pistachio kernels and ingredients can be stored for up to one year, but as with all nuts, we recommend you use from season to season, store carefully and practice first in and first out (FIFO) procedures. Pistachio kernels should have no off odors or rancidity.

- Keep cases sealed in case with inner poly liner until ready to use.
- Keep cases in cold storage for long periods of storage.
- Best stored at 0-3°C or 32-40°F and 55-70% relative humidity.
- Keep cases with inner poly liner sealed in case until ready to use.
- Pistachios contain natural antioxidants that protect freshness. Pistachios are available with added BHA/BHT for extended shelf life.
- Keep pistachio kernels away from warm areas of warehouses.
- Do not stack cases directly on concrete floors. Use pallets.
- Store pistachio kernels away from foods with strong odors (citrus, fish, etc.), as they could absorb odors.
- Consult storage conditions listed on the case to ensure you protect your pistachio nut investment.
- Available in vacuum packing for longer shelf life.

Usage/Tips

- **Bakery**
- **Confectionery**
- **Snacks**
- **Prepared Foods**
- **Dairy**
- **Others**

Bakery

- Pistachio kernels are a value-added ingredient in a wide range of commercial bakery items including: artisan breads, sweet breads, muffins, bagels, cookies, baklava and others. They mix well into dough without adverse color or acidic reactions. Magnificent pistachio pieces are used as toppings and small pieces and meal work as aesthetic enhancement to sweet goods such as Danish pastries and donuts.
- Most bakers order whole pistachio kernels, halves and pieces as a standard item from bakery or foodservice suppliers or directly from APG member processors. If your supplier does not carry pistachio kernels – ask and they will obtain this for you.
- Pick the whole pieces from the top and smaller pieces and meals can be sorted from the case.
- Pistachio kernels are a traditional item in Middle Eastern bakery and confectionery, which is a fast developing market category in North America.

Confectionery

- Pistachio kernels are used over the world in popular Mediterranean and Middle Eastern confections such as Baklava, Halva and others. Pieces and pastes of pistachio form unique confectionery centers, and halves and pieces make attractive toppings.
- Pistachio pieces are naturally shaped for efficient panning with chocolate, carob and other coatings. Select halves and pieces.
- The green color of pistachio kernels offers interesting contrast to dark, white and light chocolates.

Snacks

- Clean and well-dried pistachio kernels impart no off flavors. They accept strong spices such as chili and lime as well as sweet and savory coatings. They maintain a distinctive pistachio flavor and create synergistic new flavor combinations.
- Pistachios are synergistic with a variety of snack flavorings including salt, garlic, chile and curry.
- Pistachio kernels are a traditional ingredient in Indian “Namkeen” snack mixes.

²U.S. Department of Health and Human Services
Food and Drug Administration Center for Food Safety
and Applied Nutrition June 2009



PISTACHIO KERNELS

Prepared Foods and Entrees

- Pistachios work well in frozen foods, maintaining a soft crunch. They also stand up to reheating and microwaving.
- Pistachio meal is used in sausages as a flavoring, texturizer and antioxidant.

Dairy

- Pistachio kernels are utilized in ice creams, frozen yogurts, gelatos and sorbets. They maintain a soft crunch and impart a distinctive pistachio flavor as well as their spectacular green color.

Others

- Pistachio kernels are a traditional ingredient in Mediterranean and Middle Eastern foods and are an essential ingredient in bakery, confectionery, dips and sauces. This category is growing at a rapid pace and pistachios are a great way to move into this growing category.
- Through the efforts of APG, pistachios are becoming increasingly known for their nutritional benefits and as one of the lowest fat nuts. Consumer trends for healthier food options increase the perceived value of pistachios as a snack and as an ingredient.

Pistachio Products for Food Industry Use

The whole pistachio nut is around 47% shell and this product (called inshell) is the common offering worldwide in the Confectionery and Snack categories, which include salted inshell pistachio nuts.

For centuries, the kernel of the pistachio nut has been cherished as a food ingredient. Pistachio kernels are removed from the shell and are sorted for size and color for specific usage area in the food business.

Size classifications are determined by a screen size. American suppliers can also supply pistachio kernels and other products based on kernels per lb. or kg for items such as bakery where integration of kernels is important.

USDA Specifications for Pistachio Kernels

| | USAGE | PACKAGE SIZE* |
|--|--|--|
| Jumbo Whole Kernels 80 percent or more by weight shall be whole kernels and not more than 5 percent of the total sample shall pass through a 24/64-inch round hole screen with not more than 1 percent passing through a 16/64-inch round hole screen. | Used in applications where appearance of the beautiful green nut is important. Including toppings on cakes, confectionery, paned pistachios and culinary applications. | 25 lb. cases, poly lined and other containers. |
| Large Whole Kernels: 80 percent or more, by weight, shall be whole kernels and not more than 2 percent of the total sample shall pass through a 16/64-inch round hole screen. | Sometimes called halves and pieces. This is the most common item used in food industry. Works well as a topping and also can be integrated into products. | 25 lb. cases, poly lined and other containers. |
| Large Split Kernels: 75 percent or more, by weight, shall be half kernels split lengthwise and not more than 5 percent of the total sample shall pass through a 16/64- inch round hole screen. | Used for integration into bakery and confectionery items. Deliver high number of pieces per /lb/kg and integrate well. | 25 lb. cases, poly lined and other containers. |
| Whole and Broken Kernels: Means a mixture of any combination of whole kernels or pieces. The percentage of whole kernels and/or pieces may be specified. Not more than 5 percent of the total sample shall pass through a 5/64-inch round hole screen. | Utilized in bakery and confectionery items for mixing and integration into interior. Also used in coatings and breading and production of pastes and butters. | 25 lb. cases, poly lined and other containers. Industrial totes. |

*Check our suppliers for additional pack sizes.



PISTACHIO KERNELS

USDA Specifications for Pistachio Kernels (Continued)

Pistachio kernels of all sizes and forms are also available in foil, plastic pouches of various weights for bakery and foodservice. They are also available in vacuum packages.

Other descriptors:

Work with your food industry supplier or an APG member processor to obtain the right ingredient. Pistachio kernels are also available diced, sliced, roasted and salted. Terminologies may differ from supplier to supplier, but for the most part, the following products are readily available for the food industry:

- **Halves**—Used in panning and as a topping.
- **Halves and Pieces**—Most common product for the food industry. Select halves for topping and smaller pieces for integration into dough, ice creams and frozen desserts.
- **Small Pieces**—Where the green nut flavor and color are essential, the small pieces work well. They integrate into dough, adhere nicely to the top of items, and also integrate into ice creams and frozen desserts. Note that various suppliers have different names for small pieces.
- **Pistachio Meal**—The smallest size of pistachio pieces is the meal. This can be smaller than the small pieces all the way down to a powder. Typically, the meal is sterilized to add shelf life. This item is utilized as a topping in bakery items and is also a base ingredient for making pastes and further products such as pistachio fillings.
- **Pistachio Fiber**—A recent phenomena has been the separation of the pistachio skin from the shell and meal as a co-product. This product is receiving the attention of the nutraceutical industry.
- **Pistachio Oil**—As a co-product of the shelling process, a high-quality pistachio oil is created and used for gourmet oil. The product also has usage potential as a food ingredient in baking and confectionery and snack food applications.
- **Pistachio Pastes and Butters**—Further processors create a pistachio paste, combined with glucose to create marzipan-like fillings used in bakery and confectionery items. Commercial pistachio butters are also available and make interesting bakery and confectionery flavoring ingredients and fillings.

³ Mintel Data, 2011

Pistachios as an Ingredient

USAGE

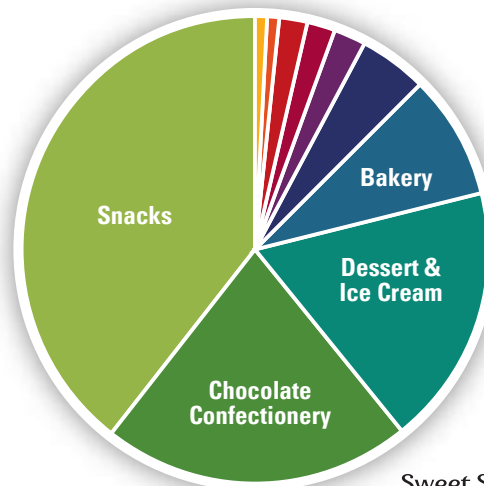
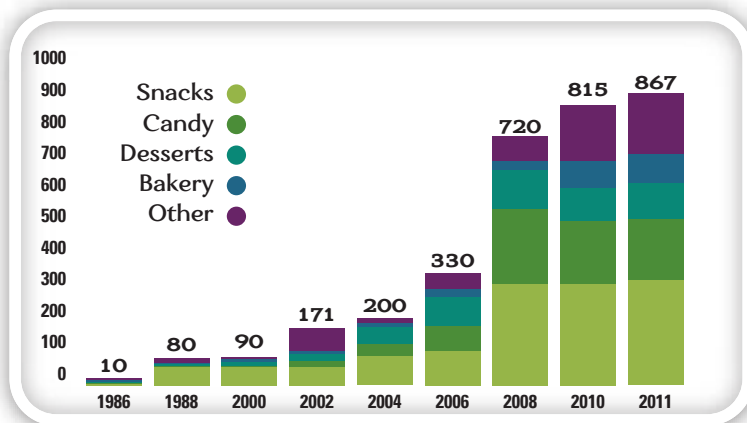


CHART: Use of pistachios in manufactured food products, North America 2005-2010

| | | |
|-------------------------------------|------|---|
| Sweet Spreads | 44 | ● |
| Savoury Spreads | 46 | ● |
| Sauces & Seasonings | 86 | ● |
| Dairy | 93 | ● |
| Processed Fish, Meat & Egg Products | 102 | ● |
| Sugar & Gum Confectionery | 215 | ● |
| Bakery | 408 | ● |
| Dessert & Ice Cream | 835 | ● |
| Chocolate Confectionery | 998 | ● |
| Snacks | 1841 | ● |

NEW PRODUCTS CONTAINING PISTACHIOS



GRAPH: Increase in new products worldwide including pistachio ingredients (up to June 2011)

PISTACHIO KERNELS PROXIMATES & MINERALS



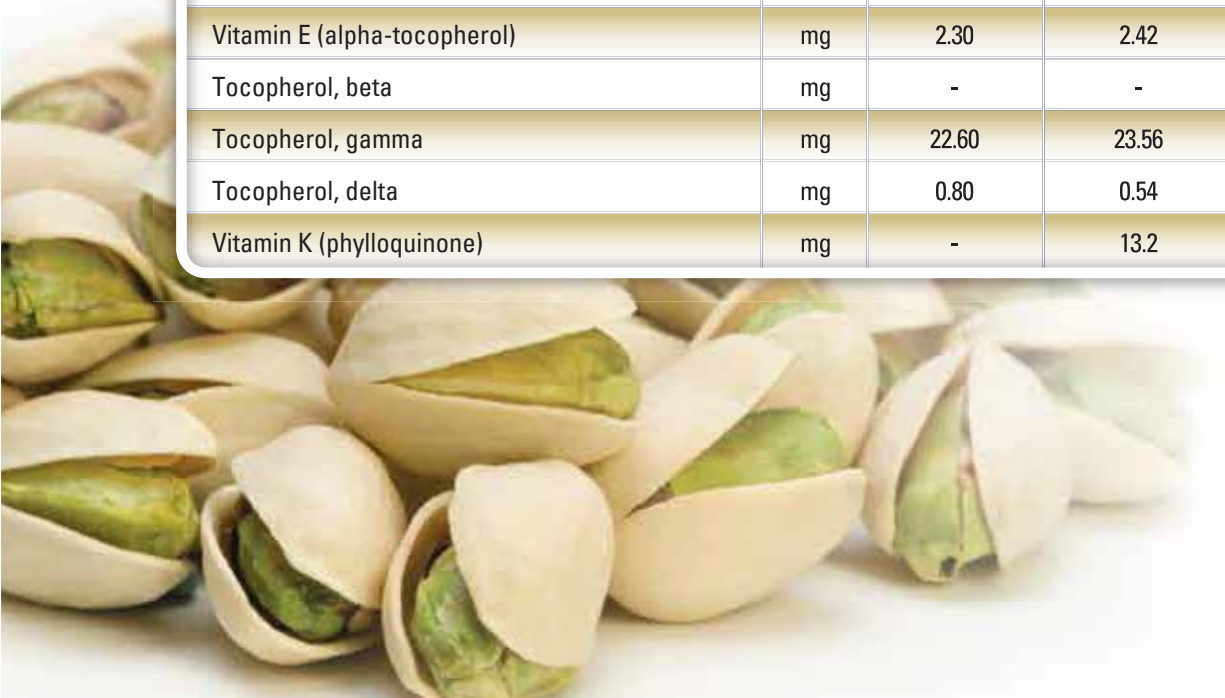
| Nutrient | UNITS | VALUE PER 100 GRAMS | | |
|-----------------------------|-------|---------------------|-------------------------------|-----------------------------|
| | | Raw Kernels | Kernels, Dry Roasted Unsalted | Kernels, Dry Roasted Salted |
| PROXIMATES | | | | |
| Water | g | 3.91 | 1.85 | 1.79 |
| Energy | kcal | 562 | 567 | 564 |
| Energy | kJ | 2352 | 2374 | 2362 |
| Protein | g | 20.27 | 20.95 | 20.95 |
| Total lipid (fat) | g | 45.39 | 44.82 | 44.82 |
| Ash | g | 2.91 | 3.00 | 3.79 |
| Carbohydrate, by difference | g | 27.51 | 29.38 | 28.66 |
| Fiber, total dietary | g | 10.3 | 9.9 | 9.9 |
| Sugars, total | g | 7.66 | 7.74 | 7.74 |
| Sucrose | g | 6.87 | 7.12 | 7.12 |
| Glucose (dextrose) | g | 0.32 | 0.26 | 0.26 |
| Fructose | g | 0.24 | 0.22 | 0.22 |
| Maltose | g | 0.17 | 0.13 | 0.13 |
| Starch | g | 1.67 | 1.38 | 1.38 |

| Nutrient | UNITS | VALUE PER 100 GRAMS | | |
|-------------------|-------|---------------------|-------------------------------|-----------------------------|
| | | Raw Kernels | Kernels, Dry Roasted Unsalted | Kernels, Dry Roasted Salted |
| PROXIMATES | | | | |
| Calcium, Ca | mg | 105 | 107 | 107 |
| Iron, Fe | mg | 3.92 | 4.03 | 4.03 |
| Magnesium, Mg | mg | 121 | 109 | 109 |
| Phosphorus, P | mg | 490 | 469 | 469 |
| Potassium, K | mg | 1025 | 1007 | 1007 |
| Sodium, Na | mg | 1 | 6 | 428 |
| Zinc, Zn | mg | 2.20 | 2.34 | 2.34 |
| Copper, Cu | mg | 1.300 | 1.293 | 1.293 |
| Manganese, Mn | mg | 1.200 | 1.243 | 1.243 |
| Fluoride, F | mcg | 3.4 | | |
| Selenium, Se | mcg | 7.0 | 10.0 | 10.0 |

PISTACHIO KERNELS VITAMINS



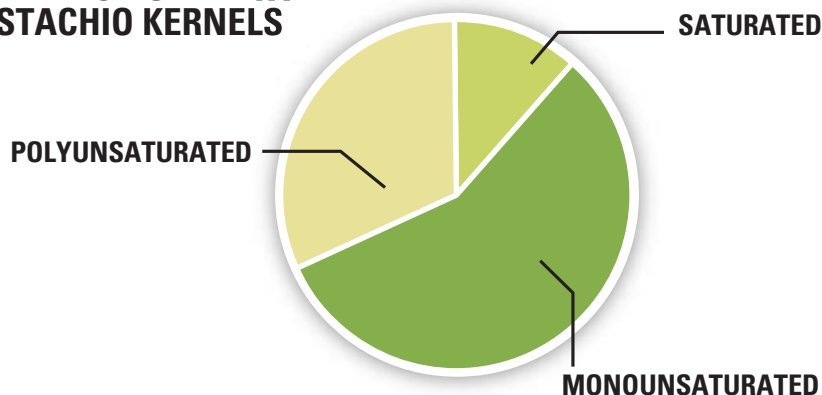
| Nutrient | UNITS | VALUE PER 100 GRAMS | | |
|--------------------------------|---------|---------------------|-------------------------------|-----------------------------|
| | | Raw Kernels | Kernels, Dry Roasted Unsalted | Kernels, Dry Roasted Salted |
| PROXIMATES | | | | |
| Vitamin C, total ascorbic acid | mg | 5.6 | 3.0 | 3.0 |
| Thiamin | mg | 0.870 | 0.695 | 0.695 |
| Riboflavin | mg | 0.160 | 0.234 | 0.234 |
| Niacin | mg | 1.300 | 1.373 | 1.373 |
| Pantothenic acid | mg | 0.520 | 0.513 | 0.513 |
| Vitamin B-6 | mg | 1.700 | 1.122 | 1.122 |
| Folate, total | mcg | 51 | 51 | 51 |
| Folate, food | mcg | 51 | 51 | 51 |
| Folate, DFE | mcg_DFE | 51 | 51 | 51 |
| Choline, Total | mg | - | 71.4 | 71.4 |
| Betaine | mg | - | 0.8 | 0.8 |
| Vitamin A, RAE | mcg_RAE | 21 | 13 | 13 |
| Carotene, beta | mcg | 249 | 156 | 156 |
| Vitamin A, IU | IU | 415 | 259 | 259 |
| Lutein + zeaxanthin | mcg | 1405 | 1160 | 1160 |
| Vitamin E (alpha-tocopherol) | mg | 2.30 | 2.42 | 2.42 |
| Tocopherol, beta | mg | - | - | 0.15 |
| Tocopherol, gamma | mg | 22.60 | 23.56 | 23.56 |
| Tocopherol, delta | mg | 0.80 | 0.54 | 0.54 |
| Vitamin K (phylloquinone) | mg | - | 13.2 | 13.2 |



PISTACHIO KERNELS

FATTY ACIDS

FATTY ACIDS IN RAW PISTACHIO KERNELS



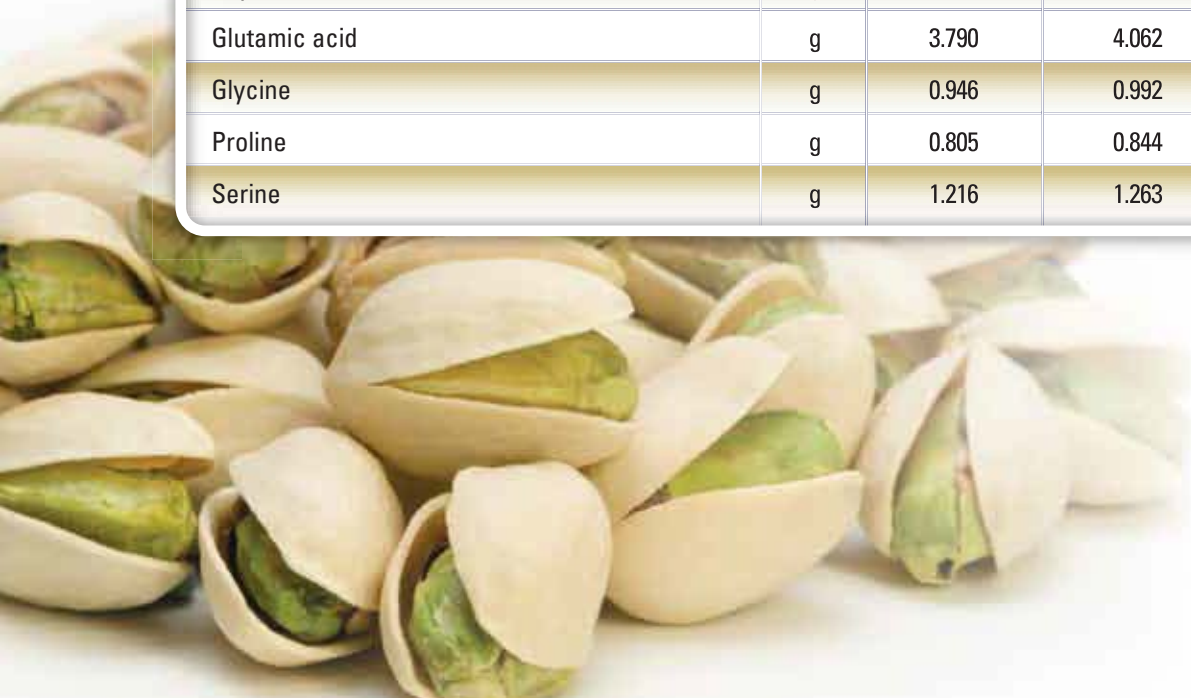
| Nutrient | UNITS | VALUE PER 100 GRAMS | | |
|------------------------------------|-------|---------------------|-------------------------------|-----------------------------|
| | | Raw Kernels | Kernels, Dry Roasted Unsalted | Kernels, Dry Roasted Salted |
| PROXIMATES | | | | |
| Fatty acids, total saturated | g | 5.556 | 5.456 | 5.456 |
| Fatty acids, total monounsaturated | g | 23.820 | 23.676 | 23.676 |
| Fatty acids, total polyunsaturated | g | 13.744 | 13.448 | 13.448 |
| Fatty acids, total trans | g | 0 | 0 | 0 |
| Fatty acids, total trans-monoenoic | g | 0 | 0 | 0 |
| Fatty acids, total trans polyenoic | g | 0 | 0 | 0 |
| Cholesterol | mg | 0 | 0 | 0 |
| Phytosterols | mg | 214 | - | - |
| Additional Phytosterols | mg | - | - | 73.6 |
| Stigmasterol | mg | 5 | 3 | 3 |
| Campesterol | mg | 10 | 10 | 10 |
| Beta-sitosterol | mg | 198 | 200 | 200 |

PISTACHIO KERNELS

AMINO ACIDS

Pistachio kernels contain a wide range of essential amino acids.

| Nutrient | UNITS | VALUE PER 100 GRAMS | | |
|-------------------|-------|---------------------|-------------------------------|-----------------------------|
| | | Raw Kernels | Kernels, Dry Roasted Unsalted | Kernels, Dry Roasted Salted |
| PROXIMATES | | | | |
| Tryptophan | g | 0.271 | 0.284 | 0.284 |
| Threonine | g | 0.667 | 0.703 | 0.703 |
| Isoleucine | g | 0.893 | 0.932 | 0.932 |
| Leucine | g | 1.542 | 1.599 | 1.599 |
| Lysine | g | 1.142 | 1.195 | 1.195 |
| Methionine | g | 0.335 | 0.343 | 0.343 |
| Cystine | g | 0.355 | 0.360 | 0.360 |
| Phenylalanine | g | 1.054 | 1.107 | 1.107 |
| Tyrosine | g | 0.412 | 0.507 | 0.507 |
| Valine | g | 1.230 | 1.262 | 1.262 |
| Arginine | g | 2.012 | 2.203 | 2.203 |
| Histidine | g | 0.503 | 0.513 | 0.513 |
| Alanine | g | 0.914 | 0.955 | 0.955 |
| Aspartic acid | g | 1.803 | 1.907 | 1.907 |
| Glutamic acid | g | 3.790 | 4.062 | 4.062 |
| Glycine | g | 0.946 | 0.992 | 0.992 |
| Proline | g | 0.805 | 0.844 | 0.844 |
| Serine | g | 1.216 | 1.263 | 1.263 |





BENEFITS of PURCHASING FROM AN APG MEMBER SUPPLIER

| ATTRIBUTE | DESCRIPTION | BENEFIT |
|--|---|---|
| Customer Service | APG member processors are committed to world-class customer service world-wide. | Business efficiencies. |
| Quality | World-class processing with modern equipment, quality inspections and traceability. | Meets the demands of fastidious food processing companies. |
| Responsibly Grown | Grown under the guidelines of Good Agricultural Practices (GAP) with energy-efficient growing and processing. APG members invest in research for constant improvement for sustainability, ensuring orchards are available for future generations. | Trusted American farm-to-market ethics. |
| Socially Responsible Producers | APG growers and processors support local social initiatives, such as community-building projects, rural improvements and charitable donations. | Positive industry image to the consuming public. |
| Inspected For Shells, Foreign Material | Shelled pistachios are mechanically and visually inspected to remove shell particles and fragments. Optical and laser methods sort out shell and foreign material. | Trusted ingredient in food manufacturing processes. |
| Availability | Pistachio ingredients are available year-round from suppliers and are in steady supply for food processors. APG members adhere to strict quality and product specifications. | Load-to-load consistency for food processing usage. |
| Ingredient Specialties | APG processors produce a wide range of set and custom processed ingredients for the food industry, including sizes, shapes and co-products. | Ingredients are ready to use without adaptation. |
| Product Development & Nutrition Expertise | APG has experts to assist the customers of our member processors with new product development or nutrition expertise. | Expert support. |
| Cleanliness | Grown under the guidelines of Good Agricultural Practices (GAP). The harvesting process ensures nuts never touch the ground; nuts that fall to the ground are tilled under. | Proactive steps ensure clean, safe and wholesome ingredients. |

