

Nutritional Analysis of Selected Nuts and Seeds

by Joanne Abramson
Fort Bragg, California

Though most of us have fed nuts to our parrots as a regular or occasional part of their diet, few of us have sat down to analyze just what nutritional benefits they were getting from nuts. Over the last few

months, I set out to accomplish this task. This proved to be a great challenge because the nutritional books that are readily available do not compare any two nuts the same way. For instance, they

might compare one ounce of pine nuts to one cup of walnuts and use the average serving of eight filberts, making any useful analysis for our purposes impossible. After several frustrating months of trying to locate a more reasonable way to compare data, I contacted Helene Swenerton, Ph.D., a nutritionist at U.C. Davis in California. She let me in on the secret that I had been missing. The data that you see in the nutritional books available in your bookstores comes primarily from a group of handbooks produced by the U.S. Dept. of Agriculture in a series called Composition of Foods. I have chosen to compare all the nuts and seeds using the values for 100 grams, edible portion (without nut shells) so that you can easily see where the individual nuts excel. Nuts do not contain any cholesterol. Cholesterol is only found in animal products. Although they do contain a high fat content, only one (coconut), contains significant amounts of saturated fat which could cause problems if fed in large amounts to birds that are not active. The rest contain mostly monounsaturated and polyunsaturated fats which are not a problem.

Two parrots, the Hyacinth Macaw and the Thick Billed Parrot, are known to eat diets composed nearly exclusively of nuts. In the case of the Thick Billed Parrot, they eat the Pinyon nut, which they harvest from the pine cone of the Pinyon Pine tree. Another nut, the Pignolia nut, is imported from Europe under the name of "pine nut" as well. However, this nut comes from the Pignolia Pine tree and has a vastly different nutritional analysis to the U.S. native Pinyon nut.

Although the nutritional needs of a caged bird will differ from a breeder bird that is in a large outdoor flight, the benefits of a varied diet which contains a wide variety of vitamins, minerals and amino acids is necessary for long term captive health. Nut shells are a source of amusement and help maintain the mandible in good condition once the nut meat is removed. I have seen our macaws spend long periods of time rubbing empty nut shells against their lower mandibles in a filing motion.

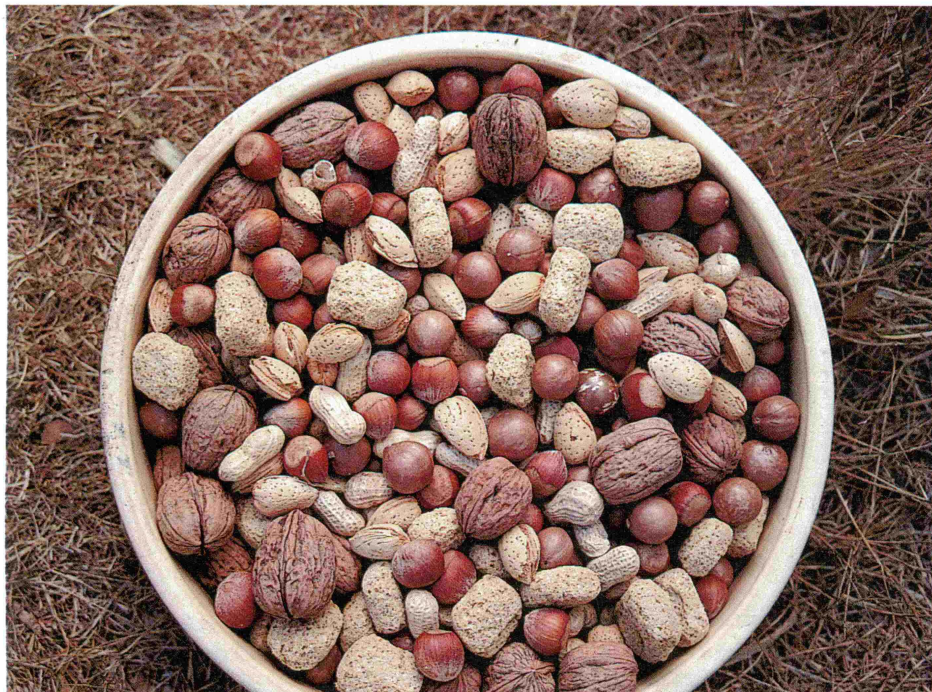
Almonds (*Prunus amygdalus*). Native to southwestern Asia. Commercially grown in California, Spain and Italy and to a lesser extent in Iran, Portugal and Morocco. They can grow to a height of 40 feet (12 meters), yield 10 to 20 pounds of nuts per tree at maturity and live 50 years. The trees bear nuts at four years old. Harvested in late summer. Highest in calcium of all the nuts analyzed. They would be beneficial to increase during breeding season to bolster the hen's reserve of calcium and help prevent soft shelled eggs.

Brazil Nuts (*Bertholletia excelsa*). Round, dark brown fruit four to six inches (10 to 15 cm) in diameter. Hard walled 1/4 inch (6 mm) thick shell resembling coconuts can weigh over three pounds (1.5 kilos). Containing 8 to 24

Photos by Joanne Abramson



Coconut Palm Tree showing nuts at various stages of ripeness.

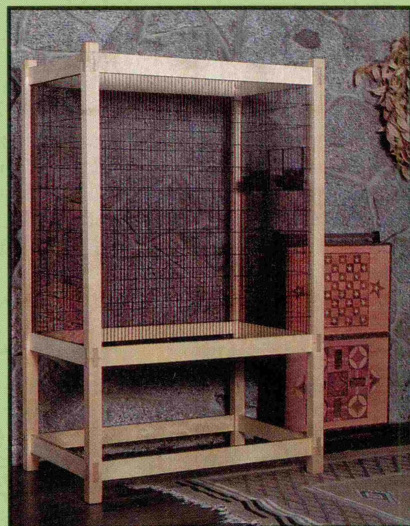


A nuts and seed mix is an important part of the diet for Hyacinth Macaws in captivity.

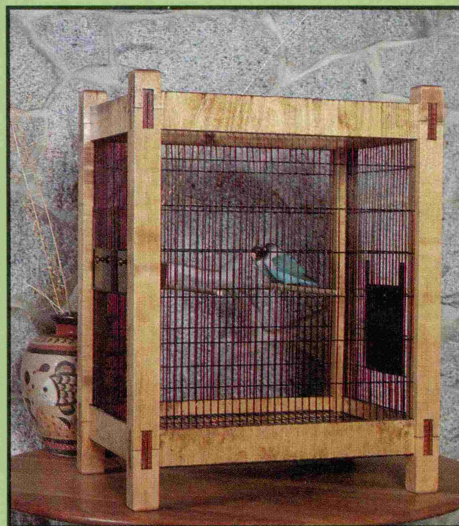
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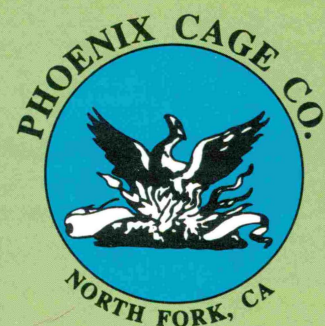
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nuts one to two inches (3 to 5 cm) arranged like sections of an orange. It takes nine years from sowing the seed to the first harvest and 14 months after blossoming for the nuts to be ready to harvest. They are harvested from November to June from wild, non-cultivated stands. The tree grows up to 150 feet (46 meters) tall, with a trunk at the base of four to six feet (1.2 to 1.8 meters) in old trees. They grow in forests in northern Brazil, Peru, Bolivia, Columbia, Venezuela and the Guianas. Those trees closest to the Amazon River are most easily harvested using the river for transportation to the larger cities for export. Less than 50% of the Brazil nuts produced a year will ever be gathered due to their inaccessible jungle locations. The tree is valuable for timber and is, therefore, a highly vulnerable crop to deforestation. Good source of calcium, phosphorus and thiamin.

Coconuts (*Cocos nucifera*). The slender coconut palm rises to a height of 80 to 100 feet (25 meters). Dwarf varieties bear nuts at three to four years old with maximum yields starting at five to six years old. Tall varieties start producing at nine to ten years old. The nuts take 12 to 15 months to mature depending on the variety. Each palm produces 30 to 60 nuts annually. Coconuts are imported from Asia, Latin America (Central and South America and the Caribbean), Oceania (Polynesia, New Guinea, Fiji) and Africa. By weight, the husk is 35%, shell 12%, meat 28% and 25% water. To prepare, use a screwdriver to puncture at least two of the three pores (called "eyes") on the rounded end. Ripe coconuts contain "milk" which, when you shake the coconuts, you can hear. Light, empty coconuts with the pores already pierced should not be bought as they are the perfect medium

for bacterial growth. They contain the highest saturated fat and the lowest protein content, although their total fat content was the lowest overall.

Filbert/Hazelnut (*Corylus* species). Native to Europe, they are produced in Turkey, Italy, Spain, and (in the United States) in Oregon and Washington. The filbert is a bush in the wild and only when the suckers of the bush are removed does it grow into the tree form, reaching 15 to 30 feet (4.5 to 9 meters) high. They flower in February and March and are ready to harvest six months later in August or September. Good source of calcium.

Macadamia Nuts (*Macadamia intergrifolia*). Native to Australia, they are most commonly thought of as a Hawaiian nut. They are currently grown in Hawaii, Costa Rica, Guatemala, Mexico, Brazil and southern California. They start to pro-

Nutritional Analysis of Selected Nuts and Seeds (per 100 gram weight)

| NUTRIENTS: (gr) | Almond | Brazil | Coconut | Filbert | Macadamia | Peanut | Pecan | Pignola | Pinyon | Black Walnut | English Walnut | Pumpkin | Safflower | Sunflower |
|--------------------------|--------|--------|---------|---------|-----------|--------|-------|---------|--------|--------------|----------------|---------|-----------|-----------|
| Calories | 589 | 656 | 354 | 632 | 702 | 567 | 667 | 515 | 568 | 607 | 642 | 541 | 517 | 570 |
| Protein | 19.9 | 14.3 | 3.3 | 13.0 | 8.3 | 25.6 | 7.7 | 24.0 | 11.5 | 24.3 | 14.2 | 24.5 | 16.1 | 22.7 |
| Carbohydrates | 20.4 | 12.8 | 15.2 | 15.3 | 13.7 | 16.1 | 18.2 | 14.2 | 19.3 | 12.1 | 18.3 | 17.8 | 34.2 | 18.7 |
| Total Fat | 52.2 | 66.2 | 33.4 | 62.6 | 73.7 | 49.1 | 67.6 | 50.7 | 60.9 | 56.5 | 61.8 | 45.8 | 38.4 | 49.5 |
| Saturated | 4.9 | 16.1 | 29.6 | 4.6 | 11.0 | 6.8 | 5.4 | 7.7 | 9.3 | 3.6 | 5.5 | 8.6 | 3.6 | 5.1 |
| Monounsaturated | 33.9 | 23.0 | 1.4 | 49.0 | 58.1 | 24.3 | 42.1 | 19.0 | 22.9 | 12.7 | 14.1 | 14.2 | 4.8 | 9.4 |
| Polyunsaturated | 10.9 | 24.1 | .3 | 6.0 | 1.2 | 15.5 | 16.7 | 21.3 | 25.6 | 37.4 | 39.1 | 20.9 | 28.2 | 32.7 |
| Cholesterol (mg) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Phytosterols (mg) | 143 | — | 47 | — | — | — | — | 141 | — | — | 108 | — | — | 534 |
| Fiber | 2.7 | 2.2 | 4.2 | 3.8 | 5.2 | 4.8 | 1.6 | .8 | 4.7 | 6.4 | 4.6 | 2.2 | 2.4 | 4.1 |
| Water | 4.4 | 3.3 | 46.9 | 5.4 | 2.8 | 6.6 | 4.8 | 6.6 | 5.9 | 4.3 | 3.6 | 6.9 | 5.6 | 5.3 |
| Ash | 3.0 | 3.3 | .9 | 3.6 | 1.3 | 2.3 | 1.5 | 4.4 | 2.2 | 2.6 | 1.8 | 4.8 | 5.4 | 3.5 |
| MINERALS: (mg) | | | | | | | | | | | | | | |
| Calcium | 266 | 176 | 14 | 188 | 70 | 58 | 36 | 26 | 8 | 58 | 94 | 43 | 78 | 116 |
| Iron | 3.66 | 3.40 | 2.43 | 3.27 | 2.41 | 3.23 | 2.13 | 9.20 | 3.06 | 3.07 | 2.44 | 14.97 | — | 6.77 |
| Magnesium | 296 | 225 | 32 | 285 | 116 | 180 | 128 | — | 234 | 202 | 169 | 535 | — | 354 |
| Phosphorus | 520 | 600 | 113 | 312 | 136 | 383 | 291 | 508 | 35 | 464 | 317 | 1174 | 644 | 705 |
| Potassium | 732 | 600 | 356 | 445 | 368 | 717 | 392 | 599 | 628 | 524 | 502 | 807 | — | 689 |
| Sodium | 11 | 2 | 20 | 3 | 5 | 16 | 1 | 4 | 72 | 1 | 10 | 18 | — | 3 |
| Zinc | 2.92 | 4.59 | 1.10 | 2.40 | 1.71 | 3.27 | 5.47 | 4.25 | 4.28 | 3.42 | 2.73 | 7.46 | — | 5.06 |
| Copper | .94 | 1.77 | .43 | 1.50 | .29 | 1.00 | 1.18 | 1.02 | 1.03 | 1.02 | 1.38 | 1.38 | — | 1.75 |
| Manganese | 2.27 | .77 | 1.50 | 2.01 | — | 1.11 | 4.50 | — | — | 4.27 | 2.89 | 0 | — | 2.02 |
| VITAMINS: (mg) | | | | | | | | | | | | | | |
| Ascorbic Acid | .6 | .7 | 3.3 | 1.0 | — | 0.0 | 2.0 | — | 2.0 | — | 3.2 | 0 | 0 | — |
| Thiamin | .211 | 1.000 | .066 | .500 | .350 | .664 | .848 | .810 | 1.243 | .217 | .382 | .210 | 1.163 | 2.290 |
| Riboflavin | .779 | .122 | .020 | .110 | .110 | .131 | .128 | .190 | .223 | .109 | .148 | .320 | .415 | .250 |
| Niacin | 3.361 | 1.622 | .540 | 1.135 | 2.140 | 14.150 | .887 | 3.570 | 4.370 | .690 | 1.042 | 1.745 | 2.284 | 4.500 |
| Pantothenic Acid | .471 | .236 | .300 | 1.148 | — | 2.764 | 1.707 | — | — | — | .631 | — | — | — |
| Vitamin B6 | .113 | .251 | .054 | .612 | — | .296 | .188 | — | — | — | .558 | — | — | — |
| Folicin (mcg) | 58.7 | 4.0 | 26.4 | 71.8 | — | 100.6 | 39.2 | — | — | — | 66 | — | — | — |
| Vitamin A IU | 0 | 0 | 0 | 67 | — | — | 128 | — | 29 | 296 | 124 | 380 | — | 50 |
| AMINO ACIDS: (gr) | | | | | | | | | | | | | | |
| Tryptophan | .358 | .260 | .039 | .216 | — | .310 | .199 | .303 | .146 | .322 | .189 | .431 | .183 | .348 |
| Threonine | .739 | .460 | .121 | .448 | .263 | .743 | .253 | .761 | .367 | .730 | .448 | .903 | .586 | .928 |
| Isoleucine | .866 | .601 | .131 | .568 | .244 | .997 | .322 | .933 | .450 | .978 | .566 | 1.264 | .717 | 1.139 |
| Leucine | 1.552 | 1.187 | .247 | 1.100 | .462 | 1.928 | .520 | 1.730 | .834 | 1.704 | .992 | 2.079 | 1.154 | 1.659 |
| Lysine | .666 | .541 | .147 | .399 | .324 | .992 | .292 | .901 | .434 | .721 | .388 | 1.833 | .534 | .937 |
| Methionine | .227 | 1.014 | .062 | .162 | .092 | .263 | .186 | .430 | .207 | .473 | .280 | .551 | .284 | .494 |
| Cystine | .358 | .349 | .066 | .299 | .096 | .329 | .209 | .435 | .210 | .468 | .345 | .301 | .311 | .451 |
| Phenylalanine | 1.113 | .746 | .169 | .686 | .260 | 1.467 | .409 | .919 | .443 | 1.107 | .628 | 1.222 | .806 | 1.169 |
| Tyrosine | .705 | .457 | .103 | .453 | .337 | 1.232 | .284 | .878 | .424 | .749 | .439 | 1.019 | .531 | .666 |
| Valine | 1.028 | .911 | .202 | .662 | .321 | 1.161 | .386 | 1.241 | .598 | 1.286 | .723 | 1.972 | 1.025 | 1.315 |
| Arginine | 2.495 | 2.390 | .546 | 2.155 | .899 | 3.456 | 1.105 | 4.668 | 2.251 | 3.661 | 2.103 | 4.033 | 1.749 | 2.403 |
| Histidine | .558 | .402 | .077 | .327 | .168 | .748 | .227 | .575 | .277 | .680 | .359 | .681 | .452 | .632 |
| Alanine | .943 | .570 | .170 | .708 | .329 | 1.133 | .338 | 1.254 | .605 | 1.061 | .609 | 1.158 | .772 | 1.117 |
| Aspartic Acid | 2.349 | 1.355 | .325 | 1.604 | .827 | 3.451 | .708 | 2.187 | 1.054 | 2.462 | 1.475 | 2.477 | 1.807 | 2.446 |
| Glutamic Acid | 5.934 | 3.151 | .761 | 3.537 | 1.782 | 6.094 | 1.545 | 4.084 | 1.969 | 5.213 | 2.809 | 4.315 | 3.699 | 5.579 |
| Glycine | 1.236 | .657 | .158 | .704 | .371 | 1.773 | .377 | 1.223 | .589 | 1.203 | .755 | 1.796 | 1.010 | 1.461 |
| Proline | 1.255 | .762 | .138 | .509 | .396 | 1.246 | .360 | 1.290 | .622 | .937 | .553 | 1.000 | .726 | 1.182 |
| Serine | .901 | .746 | .172 | .669 | .351 | 1.434 | .376 | 1.019 | .491 | 1.240 | .782 | 1.148 | .812 | 1.075 |

duce in three to seven years with full production in 10 to 12 years. Their peak of harvest is from October to June but, with the many varieties that now exist, they are available fresh year around. A mature tree can be expected to yield 50 to 150 pounds of nuts when mature. Trees can live 200 years, still continuing to produce. The shells are extremely hard and 1/16 to 1/4 inch in thickness. The highest in calories and monounsaturated fats, while nearly the lowest in protein.

Peanut (*Arachis hypogaea*). Native to South America where they are known to have been grown by Indians at least 1,000 years ago. Peanuts are part of the pea family and are considered a legume. In the United States, nearly half of the total production of peanuts are grown in Georgia, followed by (in order of production) Alabama, North Carolina, Texas and Virginia. Africa and Asia produce 85% of the world's peanuts; Brazil, China and India also produce them. The peanut is an annual crop. The pods which contain the seeds grow underground. They require four to five months after planting to ripen and be harvested. Highest in protein, extremely high in niacin and folacin.

Pecan (*Carya illinoensis*). Native to the southwestern United States. They belong to the walnut family. Commercially grown in Georgia, Texas, New Mexico, Alabama and Louisiana. They are also grown in Australia, South Africa and the Middle East. They start bearing nuts when they are five to six years old, reaching full maturity at 20 years old. They can grow up to 180 feet (55 meters) high, with trunks four to six feet (1.2 to 1.8 meters) in diameter, and can live for 75 years averaging 50 to 100 pounds (3,000 to 9,000 nuts) at maturity. They are harvested from mid September through November. High in calories, while low in protein.

Pinyon and Pignolia (*Pinus* species). Although they are both from different pine trees and are grown on different continents, they are both commercially called pine nuts. The Pinyon nut is native to the southwestern United States and northern Mexico, whereas the Pignolia is from Europe and Asia. The nuts grow in the pine cones. Thick Billed Parrots are believed to eat this nut almost exclusively in the wild. Nutritionally, however, they are very different. The Pignolia is higher in protein, while the Pinyon is higher in carbohydrates and fat.

Walnut (*Juglans nigra*, *Juglans regia*). Two primary species exist, the Black and the English (also known as the Persian) Walnut. Of the two, the English is the primary commercial nut. A native of Iran, the English Walnut was brought to the United States from southern Europe. The U.S. leads the world in production of walnuts where they are grown in California and Oregon. China, Spain, Italy and France also produce walnuts. They can grow up to 100 feet (30 meters) tall, bearing nuts at five to ten years old. They can live for 100 years, yielding one to two

bushels a year. They are harvested in September to October. The Black Walnut is produced only in the U.S., native to the eastern United States where it is grown primarily for its wood. It is most commonly sold shelled, the hard shell being a hindrance to its commercial value. The Black Walnut contains almost two times the amount of protein compared to the English Walnut. The Black Walnuts also had the highest amount of vitamin A of all the nuts.

Storage: Nuts in the shell are best stored in a cool, dry place, low in humidity. Plastic or metal garbage cans offer pest free storage for nuts that will be used within a six month time period. Shelled nuts can be stored in a tightly covered container in the refrigerator or freezer indefinitely. Nuts can become rancid if not properly stored. The peak months for availability of most nuts is from November through January, during the holiday season right after they are harvested. Macadamia and coconuts are available year around. They are cheapest when purchased in 50 pound sacks. For the average breeder, buying mixed nuts in the shell is most cost effective. For large breeders, it is best to buy individual nuts and mix your own. Macadamias are not included in mixed nuts and must be purchased individually. Coconuts can be purchased by the case and refrigerated until used.

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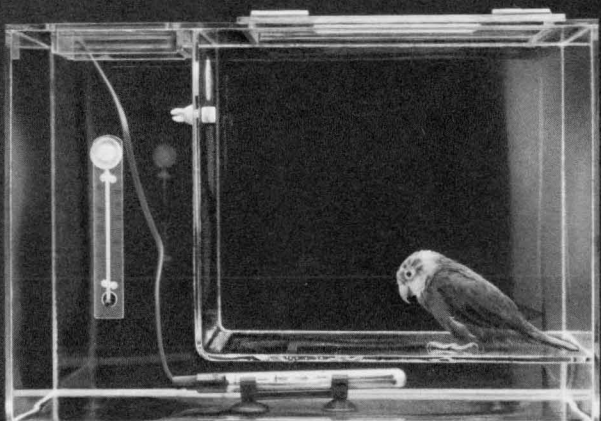
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