The PEANUT Plant

Description

Peanut (*Arachishypogaea* L.) or groundnut is an annual herbaceous plant of the Fabaceae or Legume family. It is known by many other local names such as earthnuts, ground nuts, goober peas, monkey nuts, pygmy nuts,pig nuts (Eng.) Batung-china (Sul.), and Mani (Span., Tag.) and Hua sheng (Chin.). Despite its name and appearance, the peanut is not a nut, but rather a legume.

The peanut plant has procumbent (trailing) stems and grows to around 0.5 m (20 in) tall or long.

The leaves are alternate and compound, with 4 ovate to oblong leaflets, up to 6 cm long (2.25 in). The tubular, 5-parted flowers are yellow and self-fertile. After pollination, the flower stalks elongate, growing to 6 cm long, and push the developing pods into the ground, so that the fruit must be dug up from the soil to be harvested. The fruit is an indehiscent legume (a pod that does not have sutures or split open freely), typically containing 1 to 3 soft seeds (sometimes as many as 6), each covered with a reddish brown, papery membrane. The seeds contain up to 50% oil.

Origin and Major Types

Peanut originated and was domesticated in South and Central America 3,500 years ago, and is now grown in tropical and warm-temperate regions worldwide for its seeds and their oil. It grows 30 to 50 centimeters tall. The leaves are opposite, pinnate with four leaflets,each measuring 1 to 7 centimeters long and 1 to 3 centimeters across. Its flower is a typical pea-flower in shape, 2 to 4 centimeters in diameter, and with yellow with reddish veining. *Hypogaea* means "under the earth"- after pollination the flower stalk elongates causing it to bend until the ovary touches the ground. Stalk growth continues and pushes the ovary underground where the mature fruit develops into a pod. Pods are about 3 to 7 centimeters long containing 1 to 4 seeds.

Production Trends

Globally, peanut is the 13th most important food crop with 50% of it is used as raw material for the manufacture of peanut oil, 37% for confectionery, and 12% for seed purposes. The vegetative part of peanut is excellent hay for feeding livestock because it is rich in protein and has better palatability and digestibility than other fodders.

China leads in the production of peanuts, having a share of about 41.5% of overall world production, followed by India (18.2%) and the United States of America (6.8%). In Europe, the leading producer is Greece, at roughly 2000 tons per year.

Top ten producers of peanuts in 2008/2009

Country	Production (Million Metric Tons)
People's Republic of China	14.30
India	6.25
United States	2.34
Nigeria	1.55
Indonesia	1.25
Burma	1.00
Sudan	0.85
Senegal	0.71
Argentina	0.58
Vietnam	0.50
World	**34.43**

Source: USDA Foreign Agricultural Service: Table 13 Peanut Area, Yield, and Production

In the Philippines, peanut is considered one of the major field legumes grown bylocal farmers. However, its production has been low and erratic with national average yield ranging only from 800 to1,000 kilograms per hectare. On the other hand, peanut production remains profitable when proper cultural management and efficient scheme are employed.

The Bureau of Agricultural Statistics (BAS) reported that a total of 26,107.99 hectares was planted to peanut in 2012 with annual production reaching 29,133.91 metric tons valued at Php994.26 million.

Among the top producing peanut provinces are Cagayan, Isabela, Pangasinan, La Union, Quirino, Ilocos Norte, Ilocos Sur, Aurora, Albay, and Iloilo. Cagayan Valley produces almost half of the county's total peanut.

Properties (Nutritional Values)

Peanuts are rich in nutrients, providing over 30 essential nutrients and phytonutrients. Peanuts are a good source of niacin, folate, fiber, vitamin E, magnesium and phosphorus. They also are naturally free of trans-fats and sodium, and contain about 25% protein (a higher proportion than in any true nut).

Niacin

Peanuts are a good source of niacin, and thus contribute to brain health and blood flow.

Antioxidants

Recent research on peanuts has found antioxidants and other chemicals that may provide health benefits. New research shows peanuts rival the antioxidant content of many fruits. Roasted peanuts rival the antioxidant content of blackberries and strawberries, and are far richer in antioxidants than carrots or beets. Research published in the journal *Food Chemistry* shows that

peanuts contain high concentrations of antioxidant polyphenols, primarily a compound called p-coumaric acid, and that roasting can increase peanuts' p-coumaric acid levels, boosting their overall antioxidant content by as much as 22%.

Resveratrol

Peanuts are a significant source of resveratrol, a chemical associated with but not proven to cause a reduction in risk of cardiovascular disease and cancer.

The average amount of resveratrol in one ounce of commonly eaten peanuts (15 whole peanut kernels) is 73 μg.

Coenzyme Q10

Peanuts are a source of coenzyme Q10, as are oily fish, beef, soybeans and spinach.

Uses

Peanuts have many uses. They can be eaten raw, used in recipes, made into solvents and oils, medicines, textile materials, and peanut butter, as well as many other uses. Popular confections made from peanuts include salted peanuts, peanut butter (sandwiches, peanut candy bars, peanut butter cookies, and cups), peanut brittle, and shelled nuts (plain/roasted). Salted peanuts are usually roasted in oil and packed in retail-size plastic bags or hermetically sealed cans. Dry roasted salted peanuts are also marketed in significant quantities. Peanuts are often a major ingredient in mixed nuts because of their relative cost compared to Brazil nuts, cashews, walnuts, and so on. Although peanut butter has been a tradition on camping trips and the like because of its high protein content and because it resists spoiling for long periods of time, the primary use of peanut butter is in the home. Large quantities are also used in the commercial manufacture of sandwiches, candy, and bakery products. Boiled peanuts are a preparation of raw, unshelled green peanuts boiled in brine and often eaten as a snack. More recently, fried peanut recipes have emerged – allowing both shell and nut to be eaten. Peanuts are also used in a wide variety of other areas, such as cosmetics, nitroglycerin, plastics, dyes and paints.

Peanuts are used in many sauces for South American meat dishes, especially rabbit.

Recommended Peanut Varieties

Different government breeding institutions continue to develop new high yielding varieties of peanut. In addition, some introduced varieties are also being tested under local agro-climatic conditions so that farmers could have options as towhat peanut varieties to plant.

Peanut varieties in the Philippines are as follows:

Variety	Agronomic Characteristics												Other features
	Dry Pod Yield (t/ha)		100-seed weight (g)		Shelling(%)		Days to Flower		Days to Mature		Plant Height (cm)		
	DS	WS	DS	WS	DS	WS	DS	WS	DS	WS	DS	WS	
PSB Pn 1 (UPL Pn 10)	2.0	1.5											-Medium-seeded -Two-seeded

													-Moderately resis-tant to foliar di-seases&bacte-rial wilt
NSIC Pn 02	1.87	1.34							101	103	45	74	-Resistant to peanut rust and *Cercospora* Leaf Spot (CLS) diseases -Moderately resis-tant to *Asper-gillusflavus*

NSIC Pn 03	1.80	1.86	43.6	38.2	66	65	31	28	103	104	41	64	-Moderately resis-tant to peanut rust and CLS -Mostly 3-seeded; bunch type peanut with light brown seed coat
NSIC Pn 04	1.81	2.48	61.7	51.7	68	68	26	24	101	101	64	78	-Gives high yield and better bean quality during dry season -Mostly 2 to 3 seeded; bunch type; with light brown seed coat -Moderately sus-ceptible to CLS
NSIC Pn 05	1.86	1.77	54.3	47.9	72	73	30	31	101	100	45	58	-Moderately sus-ceptible to CLS and peanut rust -Recommended as regional varie-ty in Central Vi-sayas particular-ly in Bohol -Mostly 3 seeded; bunch type; pea-nut with salmon pink seed coat.
NSIC Pn 06 (Biyaya 14)	1.89	1.97	55.3	51.1	66	67							-Tolerant to leaf hopper -High yielder in wet season in light textured soil -Two seeded Spanish variety with plump and oblong shape pods; shelling easy because of thin seed

													coat
NSIC Pn 07	1.91	1.86	55.9	43.5	67	62	30	26	100	100	50	53	-Moderately sus-ceptible to CLS and peanut rust -Can be grown in dry and wet sea-sons; gives bet-ter bean quality in dry season -Mostly 2 to 3 seeded; bunch type; peanut with pinkish seed coat
NSIC Pn 08	1.80	1.87	45.2	42.7	68	65	27	26	98	97			-Moderately sus-ceptible to CLS and peanut rust -Can be grown in dry and wet sea-sons; gives better bean quality in dry season -Mostly 3 seeded; bunch type; peanut with creamy or light tan seed coat
NSIC Pn 09	1.60	1.62	57.2	57.4	68	69	25	25	80	90			-Moderately sus-ceptible to CLS and peanut rust -Can be grown in dry and wet sea-sons; gives bet-ter bean quality in dry season
NSIC Pn 10	1.54	1.66	60.0	53.5	69	70	25	25	89	92	44.2	65.0	-Moderately sus-ceptible to CLS and peanut rust -Can be grown in dry and wet sea-sons; gives bet-ter bean quality in dry season -Mostly 2 to 3 seeded; big sized beans; bunch type; peanut with pinkish seed coat.
NSIC Pn 11 (Namnama-1)	1.63	1.60	55.2	47.2	69	68	27	25	98	99	38.6	56.5	-Resistant to CLS and peanut rust -Can be grown in the dry and wet seasons -Spreading type peanut making it a

													breakthrough for off-season (WS) production. -Ideal for both processing and boiling (table type) purposes.
NSIC Pn 12 (Ilocos Pink)	2.3	1.93											-Two-seeded -Medium-seeded -Medium maturing

NSIC Pn 14 (Namnama 2)	2.23	2.37											-Wet season variety with stable high yield -Large-seeded -Attractive as boiled and roasted nuts -Confectionery variety
NSIC Pn 15 (Asha)	3.10	2.85	82.8	45	72	73	27	33	130	150	50	60	-Confectionery variety -Resistant to bacterial wilt, CLS and rust. -Ideal livestock forage due to high fresh biomass and dry matter content.

Cultivation

Soil and Climatic Requirements

The best soil suited to peanut production is well-drained, light colored, loose,friable, sandy loam that contains high levels of calcium, a moderate amount of organic matter, and with moderate to slightly acidic pH ranging from 5.8 to 6.5. Optimum peanut production can be achieved in areas with topsoil depth of 4 to 60 centimeters, friable,with sandy loam or clay loam subsoil.

Peanut can be grown practically in all types of climatic conditions. In the Philippines, peanut can be grown throughout the year provided irrigation is available. In general, dry season crop (October-January) gives higher yields and better quality beans than the rainy season crop.

Liming

Acidic soil with pH below 5.8 is not profitable for peanut production. This can be corrected by adjusting the pH through application of lime as follows:

Amount of ground limestone (t/ha) needed to bring soil pH to 6.0

Initial pH	Sandy	Sandy Loam	Loam	Silt and Clay Loam	Clay
4.0	2.0	3.5	4.5	6.0	7.5
4.5	1.5	2.5	3.2	4.2	5.2
5.0	1.0	1.5	2.0	2.5	5.0
5.5	0.5	0.5	0.8	0.9	2.0

Note: Lifted from Farm Primer on Peanut Production Technology; PCARRD & CVARRD, 2008.

Apply the required amount of lime by incorporating into the soil one to two months before planting. While very acidic soils cannot be corrected right away, gradual application of the required volume of lime in split doses for 3 to 4 years is recommended.

Where lime is not needed, sidedress 200 to 300 kilograms per hectare of calcium nitrate at the peak of flowering. Immediately cover the applied fertilizer by hilling-up. Do not apply lime together with fertilizers to avoid unfavorable chemical reactions.

Cultural Management Practices

Land Preparation

Peanut requires a thoroughly prepared field to provide favorable conditions for good crop establishment as well as conditions necessary for effective weed control andproper pod development. Plow and harrow the field 2 to 3 times at weekly interval to allow weed seeds to germinate, and achieve good soil tilth. Set furrows 50-60 centimeters apart to allow relative ease of weeding, cultivation and spraying without disturbing the growing crop. If possible, rows should run from east to west direction to allow better peanut crop light interception. Furrow when the soil has the right moisture for planting or when soil does not stick to the plow during the operation.

Seed Inoculation

When inoculants are available, place the seeds in a basin big enough for easy mixing. Moisten the seeds with water then pour or mix 100 grams of inoculants (*Bradyrhizobium spp.)* to 10 kilograms of moistened shelled peanut seeds. Mix thoroughly until all the seeds are coated with inoculants. Be sure that inoculated seeds are not exposed to direct sunlight by placing them under shade while they are not yet planted. Plant inoculated seeds as soon as possible. Do not mix inoculants with seeds that have been treated with pesticides.

Planting

The use of shelled peanut seeds as planting materials is the standard practice.Sow peanut seeds using hill or drill method. In hill method, plant one seed per hill at a distance of 5-10centimeters during the dry season and 10-15centimeters during the wet season. With drill method, plant 18-20 seeds per linear meter during the dry season and 10-15 seeds per linear meter during the wet season. Distribute the seeds uniformly into the furrows. Approximately 120-150 kilograms unshelled peanut is required per hectare in both methods.

Fertilizer and Nutrient Management

Fertilizer requirements should be determined on the basis of soil analysis of the area. A balanced fertility program with emphasis on available levels of phosphorous, potassium, magnesium, calcium, and nitrogen, is essential to high yields. Certain micronutrients, including zinc, iron, manganese, copper, boron and molybdenum are also essential to peanut production.However, in the absence of soil analysis, a general recommendation of 30-30-30 kg NPK per hectare maybe used. Prior to planting, apply 4 bags of complete fertilizer per hectare on furrows and cover thinly with soil. Sidedress 2 to 6 bags of calcium nitrate, 25 to 30days after planting. Application of calcium nitrate ($Ca(NO_3)_2$) minimizes the production of “pops” or empty peanut pods. Initial study conducted at BPI La Granja revealed that peanut can also be fertilized with vermi compost, commercial organic fertilizer or decomposed carabao manure at the rate of 3.0, 1.0, and 5.0 tons, respectively.

Weed Management and Cultivation

Weeds compete with peanut which could significantly reduce yield, and often harbor insect pests and diseases. Weed control is more critical in peanut production than in other crops because peanut grows slowly and cannot compete well with weeds during the most part of its growth cycle. Hence, weeds should be controlled during the first 4-8 weeks after planting.

Rottboelliacochinchinensis(Lour.) W.D. Clayton or itchgrassis the most troublesome weed associated with peanut. It is the most difficult weed to control. This weed produces approximately 5,000 viable seeds per plant per year. It remains viable for a year or longer, resulting in flushes of germination. It is highly competitive because it grows taller and more vigorous than peanut.Other weed species that can suppress peanut growth are the grasses *Eleusineindica* L. (asparagus, sabung-

sabungan', 'dinapuluk', 'bakis-bakisan', 'bikad-bikad', 'palagtiki', 'dog's tail), the sedge *Cyperusrotundus* L. (boto-botones', 'muth'a, 'mal-apulid',' sur-sur', and malapandang), and broadleaf *Ipomeatribola* L. ('kamote-kamotehan' and baging').

The following cultural practices could help control weeds:

a. Off-bar by passing a cultivator or a carabao drawn plow in between rows of peanut 20 to 25 days after planting to eradicatethe germinating and growing weeds.
b. Follow up off-barring by handweeding to remove remaining weeds especially those near the base of the peanut plants. After handweeding, sidedress the fertilizer (calcium nitrate) and immediately hill-up by passing a carabao drawn plow between the rows of peanut to cover the applied fertilizer and likewise improve crop anchorage.
c. In addition, it may be necessary to do spot weeding from time to time during the growth and development period of the peanut crop particularly when weed population is still high. However, caution must be observed not to disturb the developing pod.

Water management

Moisture is a limiting factor for crop production. Peanut is relatively drought tolerant but like most field legumes, it needs sufficient water during germination, flowering, and pod filling stages. During dry season, irrigate dry soils before planting to ensure good peanut crop germination and establishment. In addition, it is important that the soil should have sufficient moisture during pegging and pod development stages, thus irrigate lightly but frequently when the soil is dry. Topsoil must remain moist at pegging stage to facilitate good penetration of pegs into the soil. Besides affecting yield, the absence of soil moisture at pod and seed development stages will also encourage seed and pod invasion by *Aspergillusflavus*. When peanut is planted in late dry season, 3 to 4 applications of irrigation at 40-50 millimeters per application are sufficient. Peanut requires a minimum of 500-600 millimeters of water per cropping season.

Crop Protection

A. Common Insect Pests

1. **Pod Borer** (*Helicoverpaarmigera*)

Moths have a wing span of 40 millimeters; forewings are dull brown. Larvae are dark greenish brown while the creamy eggs are laid singly on young leaves and flower buds. It pupates in the soil.

Larvae feed on the foliage, preferably the flowers and buds. When tender leaf buds are eaten, symmetrical holes or cuttings can be seen upon unfolding of leaflets.

Control Measures:

a. Practice thorough land preparation by deep plowing alternated with harrowing at weekly interval not only to eradicate weeds but also to destroy and/or eradicate the pest.
b. Apply *Trichogrammachilonis* at 200 strips per hectare 40 and 50 days after planting peanut.
c. Conserve the natural bio-control population in the field such as spiders, long horned grasshoppers, ants, ground beetle, predatory cricket, earwig, braconids, *trichogramma*.
d. Spray appropriate chemical insecticides following the recommended doses when only insect population is above the economic threshold level (ETL).

2. **Aphids** (*Aphis craccivora*)

They are small-sized insects about 2 millimeters long; pear shaped; green to greenish brown or greenish black; nymphs are dark brown; adults are mostly wingless. It has 12-14 generations per year.

Larvae feed on the foliage, usually the flowers and buds. Nymphs and adults suck plant sap from tender growing shoots, flowers, causing stunting and distortion of the foliage and stems. They excrete honeydew on which sooty molds flow forming a black coating. Aphids are also known to transmit peanut stripe virus and peanut rosette virus.

Control Measures:

a. Timely planting of the crop.
b. Use varieties which are densely hairy and with stiff leaves.
c. Handpick and destroy insect pests including affected plant parts.
d. Conserve natural enemies like flower bugs (anthocorids), lady bird beetles (coccinellids), praying mantis, green lace wing (chrysopids), long horned grasshoppers and spiders.
e. Spray appropriate insecticide following recommended dosage on the label.

3. **Termites** (*Odontotermesspp*)

Termites favor red and sandy soils. These are social insects; live in termitaria, in distinct castes, workers, kings and queen. Eggs are laid on plants and in the soil. Workers' are small (4 millimeters) and have soft, white body and brown head.

Termites penetrate and hollow out the tap root and stem thus kill the plant. It bores holes into pods and damages the seed. It removes the soft corky tissue between the veins of pods causing scarification; weakens the shells that make them liable to entry and growth of *Aspergillusflavus* that produces aflatoxins.

Control Measures:

a. Digging the termitaria and destruction of the queen is most important in termite management.
b. Use only well-decomposed organic manure.
c. Harvest the peanuts as soon as they are matured
d. Practice clean culture.
e. Irrigate the crop frequently during dry season.
f. Practice thorough land preparation by weekly interval of plowing and harrowing
g. Practice intercropping peanut with other non-legume crops.
h. Destroy debris, termite nests and queen.
i. Apply appropriate chemical insecticides at recommended doses only if the insect population is over the ETL.

B. Common Diseases

1. **Cercospora Leaf Spot**(*Cercosporaarachidicola)*

Disease infection usually starts in about one month after sowing with small chlorotic spots appearing on leaflets which eventually enlarged and turned brown to black and assumes sub-circular shape on upper leaf surface. Lesions also appear on petioles, stems and stipules. In severe cases, several lesions coalesce and result in premature senescence.

Control Measures:

a. Use tolerant varieties.
b. Avoid planting peanut in monoculture.
c. Practice crop rotation with non-host crops preferably cereals such as corn and rice.
d. Do not plant peanut in areas with long periods of high relative humidity, and frequent rainfall as these conditions favor the disease.
e. Practice clean culture.
f. Foliar application of botanical pesticides like neem leaf extract (2-5%) or neem seed kernel extract (5%) at 2 weeks interval, 3 times starting from 4 weeks after planting can be employed.

2. **Late Leaf Spot** (*Phaeoisariopsispersonatum)*

Infection starts at around 42-57 days after planting. Black and nearly circular spots appear on the lower surface of the leaflets; lesions are rough in appearance; and in extreme cases many lesions coalesce resulting in premature senescence and shedding of the leaflets.

Control Measures:

a. Calendar the planting of peanut in such a way that no frequent rains could be experienced by the crop at vegetative stage.
b. Avoid heavy application of nitrogen and phosphorus fertilizers.
c. Use resistant varieties.
d. Practice crop rotation and clean culture.
e. Spraying of botanical extracts from neem and other botanical plants can be useful.
f. Use appropriate pesticide following the recommended dosage and frequency of spraying indicated on the level, only when necessary.

3. **Peanut Rust**(*Pucciniaarachidis)*

It can be readily recognized as orange colored circular pustules (uredinia) of about 0.5 to 1.4 millimeters in diameter that appear on the lower or upper leaflet surface and rupture to expose masses of reddish brown urediniospores. In highly susceptible cultivars, the original pustules may be surrounded by colonies of secondary pustules. Severely infected leaves turn necrotic and desiccate though may remain attached to the plant.

Control Measures:

a. Use resistant varieties.
b. Avoid planting peanut during wet season.
c. Practice crop rotation and field sanitation.
d. Destroy volunteer (self-sown) peanut plants and crop debris to reduce or minimize primary sources of inoculum.
e. Spraying of appropriate synthetic pesticide or botanical extracts can be an option.

4. **Stem Rot**(*Sclerotiumrolfsii)*

White fungal threads develop over affected plant tissue particularly the stem; base of the plant turns yellow and then wilts down; infected peanut seeds show a characteristic bluish-grey discoloration.

Control Measures:

a. Observe proper timing of planting as the disease is severe during months with alternate wet and dry periods.
b. Plant peanut in flat or lightly raised beds especially during wet

season.

c. Seed treatment is recommended.

5. **Bud Necrosis (Peanut Bud Necrosis Virus (PBNV)**

This virus is transmitted by thrips. Chlorotic spots with necrotic rings and streaks appear on young leaflets. Terminal bud necrosis occurs when temperature is relatively high. As infected plant matures, it becomes stunted developing short internodes; and auxiliary shoots proliferate.

Control Measures:

a. Observe timely planting of peanut as wet weather coupled with a low temperature favors the disease.
b. The virus survives in the hosts of thrips and acts as a source of inoculum for the vector, thus spray appropriate insecticide to control thrips.
c. Grow resistant varieties.
d. Destroy alternate weed hosts like *Bidenspilosa* (pisau-pisau)*, Erigonbonariensis, Tagetesminuta*, and *Trifoliumsubterraneum*.
e. Increase plant density, and do early planting.
f. Peanut should be intercropped with fast growing cereal crops like corn.

Harvesting

Peanut should be harvested at the right stage of maturity. Harvesting is normally done by passing a carabao drawn plow between furrows beforehand pulling or uprooting the plants, thus it is labor intensive. It requires 6 to23 man-days to harvest a hectare.

The maturity of peanut can be determined by the following indications: (a) gradual withering and yellowing of the leaves of majority of the plants which are more noticeable during dry season planting; (b) expected maturity date of varieties ranging from 90-140 days depending on the type of the peanut variety and the planting season; (c) physiological maturity is also indicated by hardness of most of the pods, 70-80% of pods have prominent veins, inner portion of the shell turns dark; vascular strands on the shell becomes more distinct seed coat has the color of the genotype; and seed kernels are plump and full grown.

Post-Harvest

Pod Picking/Stripping/Threshing

For small scale production, peanut pods are picked by hand. Pods are immediately sun dried to prevent deterioration. Picking is done in such a way that the peduncle (stem attached to the pod) does not go with the pod. The pods are then washed and the inferior, immature ones are separated from the mature and sound peanut pods. The plant residues are usually either left in the field to decompose or kept and used as animal fodder.

During wet season, farmers usually strip or thresh immediately after harvest so that peanut pods can be immediately dried to the desired moisture content and prevent deterioration. For dry season crops, stripping is delayed because farmers windrow the plants in the field to reduce plant and pod moisture content. Stripping can be done manually or with a mechanical peanut stripper.

Drying

Sun drying is the most commonly used drying method which is considered as the cheapest but very dependent on climatic condition. It will take 2-5 days to sundry the harvested peanut crop in the field. In general, drying is done twice within the cycle of postharvest operation: initial drying prior to threshing, and final drying before pod shelling.

When peanuts are grown as second crop, windrow drying in the field is sometimes followed by aeration in small shaded huts prior to threshing and final peanut pod drying as practiced in Cagayan Valley.

For seed purposes, only sound, mature, clean and well-filled peanut pods must be selected. Sundry selected peanut pods to attain 8 to 10% moisture content. This is achieved by sun drying the windrowed pods for 2-3 days and the newly harvested pods for 4 to 5 days. Spread selected pods uniformly into the drying floor, turning them from time to time. Care should be observed not to damage pods.

Shelling and Sorting

For immediate marketing of peanuts, pods are shelled carefully to avoid scratching, splitting and rupturing of the seed coat, as well as breaking of the cotyledon. Traditionally, farmers shell peanut manually. Hand shelling is the preferred method of obtaining peanut seeds because it protects seeds from being broken.

After shelling, manually clean and sort peanuts into whole nut, reject, broken or unshelled. The common practice is to winnow peanut by using circular bamboo tray "bilao" and hand pick the nuts. Substandard kernels and other impurities are manually separated from good kernels.

Storing

For seed purposes, peanuts are stored unshelled maintaining seed viability for about six months. The shells act as a natural protective covering of the seeds against mechanical damage and insect infestation.

After the last sun drying, allow the dried peanuts to cool for about 6 to 12 hours. Store the dried pods in a tightly closed storage container (if available) to prevent entry of air and moisture. Place storage containers inside a dry and rain protected structure. Before use, open the seed storage container 3 to 5 days before planting. In the absence of tight containers, dried peanut seeds are placed in sacks and stored in a well-ventilated room or inside a cold storage. Sundry the seeds for a few hours a day prior to planting as moisture content may have increased in the peanut seeds during storage.

For shelled peanuts, farmers or traders usually store them only for not more thantwo months before marketing or processing as shelled peanuts easily deteriorate.

Cost of Production and ROIfor a One-Hectare Land

Inputs	Unit	Quantity	Unit Cost (PhP)	Cost per /ha (Php)	
				(conven-tional)	(Organic)
A. MATERIALS					
Seeds (Unshelled)	kg	125	70	8,750	8,750
Organic Fertilizer	bag	40	150	6,000	6,000
Triple 14	bag	4	1,200	4,800	
Calcium Nitrate	bag	2	1,900	3,800	
Fermented Plant Juice	liter	4	300		1,200
Fermented Fruit Juice	liter	2	400		800
Insecticide	liter	0.5	1,200	600	
Fungicide	sachet	1	450	450	
Botanical Pesticides(EM5-plus)	liter	4	300		1,200
Plastic Twine	roll	2	60	120	120
Sacks	pcs	150	8	1,200	1,200
SUB TOTAL				**25,720**	**19,270**

B. LABOR					
Land Preparation					
Plowing, 2x	MD	10	220	2,200	2,200
Harrowing, 2x	MD	8	220	1,760	1,760
Furrowing	MD	5	220	1,100	1,100
Fertilizer Application					
a) Organic fertilizer	MD	4	220		880
b) Basal fertilizer	MD	4	220	880	880
c) Sidedressing of calcium nitrate	MD	2	220	440	
Planting	MD	8	220	1,760	1,760
Off-barring	MD	2	220	440	440
Firsthandweeding	MD	10	220	2,200	2,200
Hilling-up	MD	2	220	440	440
Second weeding	MD	5	220	1,100	1,100
Spot weeding	MD	3	220	660	660
Spraying of insecticide/fungicide	MD	2	220	440.00	
Spraying of FPJ, FFJ &EM5-plus	MD	8	220		1,760
Harvesting and handpicking	MD	20	220	4,400	4,400
SUBTOTAL				**17,820**	**19,580**
Fixed cost (Land rental per season)				3,000	3,000
Contingency (10%)				4,340	3,995
TOTAL PRODUCTION COST				**50,894**	**45,735**
GROSS INCOME4,000 kilograms fresh pod yield per hectare at P18.00/kg				**72,000**	**72,000**
NET INCOME				**21,106**	**26,265**

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