ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)

DOI: 10.5958/2249-7137.2021.00591.7

STUDYING THE INFLUENCE OF SOWING DATES ON THE GROWTH, DEVELOPMENT, YIELD AND QUALITY INDICATORS OF PEANUT VARIETIES IN THE IRRIGATED CONDITION OF TASHKENT REGION

Khudaykulov Jonibek Bozarovich*; Buriev Iskandar Astanovich; Irnazarov Shuxrat Ismatullayevich***; Shavkatova Zarnigor Shavkatkizi*****

*Professor (DSC),
TSAU, UZBEKISTAN

**Professor (DSC),
KEEI, UZBEKISTAN

***Associate Professor (PhD),
KEEI, UZBEKISTAN

**** Master Student,
UZBEKISTAN

ABSTRACT

The peanut or groundnut (Arachishypogaea) is a species in the legume family (Fabaceae). There are different varieties like Virgina group, Spanish group, Runner group, Valencia group, Tennessee red and Tennessee white. Peanut consists of 30 essential nutrients and phytonutrients. Peanuts are a good source of vitamins and metals. Peanut hulls consist of crude fiber, cellulose, water, crude protein, ash and fat.This study was conducted in the experiment fields at the Plant Science Department of the Faculty of Agrobiology at Tashkent State Agrarian University in 2009-2011. The experiment was performed in a split-plot design with 3 repetitions. The goals of this study were to determine the appropriate planting date for peanut under the ecological conditions of Tashkent and to investigate the effect of different planting dates on some agronomic traits, yield, and yield components of 4 local peanut varieties: Tashkent-112, Kibray-4, Salomat and Mumtoz. It was determined that the planting date had a statistically significant effect on pod yield, days to maturity, days to 50% flowering date, number of pods per plant, plant height, shelling percentages, pod yield per plant, and 1000 seed weight. The results showed

that the suitable planting date was 5 May and the Mumtoz and local varieties were promising for Tashkent region conditions.

KEYWORDS: *Peanut (Arachishypogaea L.), experiment, design, repetition, statistic, flowering, maturity, seed weight, pods, yield, oil.*

INTRODUCTION

Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years and have served humans well as valuable components of medicines, seasonings, beverages, cosmetics and dyes [4].

The peanut or groundnut (*Arachishypogaea*) is a species in the legume or "bean" family (Fabaceae). The peanut was probably first cultivated in the valleys of Peru. The peanut is an important human food crop because of its high protein and oil content. Peanut seed is used as a source of cooking oil and in confectionary products for human consumption [11].

It is an annual herbaceous plant growing 30 to 50 cm (1.0 to 1.6) tall. *Hypogaea*means "under the earth", after pollination, the flower stalk elongates causing it to bend until the ovary touches the ground [5].

Peanut consists of 30 essential nutrients and phytonutrients. Peanuts are a good source of vitamins and metals. Peanut hulls consist of crude fiber, cellulose, water, crude protein, ash and fat. Chemical constituents present in the plant are acids, arachin, lecithin protein, flavonoids, beta-carotene, amino acids, minerals, fat, carbohydrates etc. It has varies pharmacological activities like antimicrobial, antifungal, antiviral, antioxidant, anticancer, antihypertensive, neuroprotective, antimutagenic, antiproliferative, anti-inflammatory. Peanuts can help to enrich the soil. Peanuts are legumes and are able to fix nitrogen in their roots [4].

*Synonyms:*Peanuts are known by many other local names such as **e**arthnuts, ground nuts, goober peas, monkey nuts, pygmy nuts and pig nuts. Despite its name and appearance, the peanut is not a nut, but rather a legume [12].

*Use as Alternative Fuel:*The root of the peanut plant is rich not only in minerals and antioxidants, but also in high-protein peanut oil. The oil found within the peanut plant's roots combines with other food oils and a low grade petroleum blend to create biodiesel fuel. Biodiesel fuel is as biodegradable as sugar and burns at a much higher temperature than petrodiesel, reducing the risk of highway explosions and fiery wrecks [3; 8; 13].

In 2018, world production of peanuts (reported as groundnuts in shells) was 46 million tons, led by China with 38% of the global total, followed by India (15%). Other significant producers were Nigeria, Sudan, and the United States [1;2;7].

At present, to meet the needs of the world population with food, it is important to increase the yield and quality of oilseeds, including peanuts. Globally, peanuts are sown in 117 countries of the world on an area of 27.66 million hectares, the total yield is 43.98 million tons, and the average yield is 1.59 t / ha [1; 10].

This crop on the Asian continent is cultivated on 56% of the area, in Africa on 40% of the area, where these continents account for 68 and 25% of the total production. Uzbekistan ranks 51st in

the world for the cultivation of peanuts; To date, the scientific substantiation of the technology of cultivating varieties of peanuts and providing the population with food by increasing the gross yield is an urgent issue.

The object of the research work is typical sierozem soil of the Tashkent region, peanut varieties: Tashkent-112, Kibray-4, Salomat and Mumtoz, planting dates, nitrogen, phosphorus and potassium fertilizers.

The main objectives of the study: to determine the influence of the optimal planting dates of peanut varieties as the main crops on morphobiological characteristics, photosynthetic activity, yield and oil content of seeds.

The aim of this research work is studying the influence of planting dates on the growth, development, yield and quality indicators of peanut varieties in the irrigated condition of Tashkent region.

MATERIALS AND METHODS

The field trials were conducted for 3 years (2009-2011) at the Plant Science Department of the Faculty of Agrobiology at Tashkent State Agrarian University, Tashkent, Uzbekistan. The experimental field is located near Tashkent, in the upper part of the Chirchikriver, Kibray district of the Tashkent region, at an altitude of 481 m above sea level, $41^{0}11^{II}$ northern latitude and $38^{0}31^{II}$ east longitude. The terrain of the site is uneven, slightly wavy, with a general slope to the Salar canal. Irrigation water was pumped from the Bozsuv channel.

The soil of the experimental site is long-irrigated sierozem, non-saline, with a low content of humus 0,9-0,7%, nitrogen 0,082-0,066%, phosphorus 0,153-0,139%, potassium 1,33-1,30%.

TABLE 1 THE SOIL CHARACTERISTICS OF THE EXPERIMENTAL AREA

№	Depth (sm)	Gross content, %				Mobile forms, mg/kg		
		humus	nitrogen	phosphorus	potassium	$N\text{-}NO_3$	P_2O_5	K_2O
1	0-30	0,925	0,083	0,152	1,33	4,8	47,1	180,7
2	30-50	0,715	0,070	0,134	1,30	3,2	40,3	162,0

Field and laboratory methods of research, developed by the Uzbek Research Institute of Plant Production, were used. Phonological observations were conducted according to the Methodology of the State Variety Testing of Agricultural Crops. Statistical processing of data was carried out according to B.Dospekhov. Application of organic and mineral fertilizers and necessary agro technics on these soils, enable to obtain the high yields of field crops.

CLIMATIC CONDITIONS

The climate of Tashkent region, as well as of Uzbekistan in general, has a sharply continental character. Spring comes early: at the beginning of March, the air temperature rises noticeably, although sometimes a sharp cooling occurs. During this period a significant part of the annual precipitation falls. Summer is long, hot and dry.

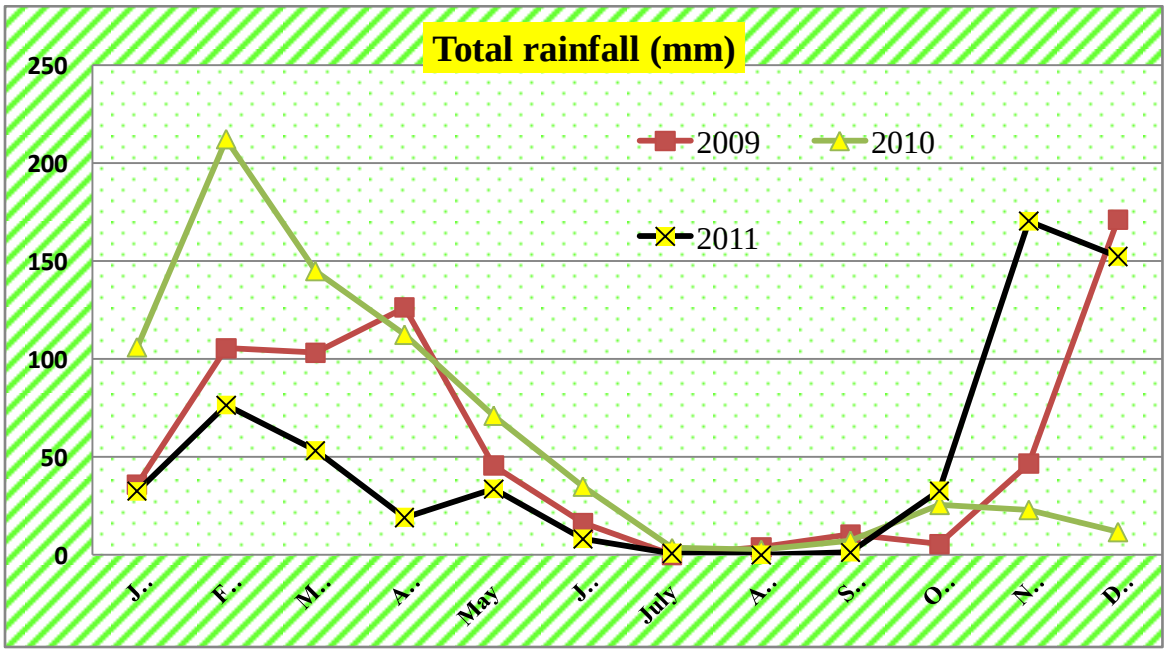
It was observed that in the years of the experiment, depending on the climatic conditions, field germination period and duration of the field germination of the peanut variety seeds were different.It was established that peanuts are a thermophilic crop. The optimal temperature for the

growth and development of this culture is 25-30^{0}C. At temperatures below 12^{0}C, no fruit is produced. Usually sprouting of peanuts seeds begins at a temperature of 14-15^{0}C.

TABLE 2 THE CLIMATIC CONDITIONS DURING THE GROWING SEASON AND LONG YEARS MEAN (LEM=1960-2011)

Month	Meantemperature (^{0}C)			
	longyearsmean	2009	2010	2011
January	0,2	3,2	5,6	0,7
February	2,4	6	2,9	1,8
March	8,0	10,8	10,9	9,1
April	14,8	12,6	16,8	17,4
May	20,1	19,8	20,4	22,6
June	25,4	24,4	25,6	26,4
July	27,2	27,7	27,2	27,9
August	25,4	25,5	27	26,8
September	20,0	20,8	21	21,1
October	13,7	15	16,6	14,9
November	7,4	7,7	9,4	5,1
December	2,5	4,9	3,4	-0,7
Average	**13,9**	**14,9**	**15,6**	**14,4**

Sometimes precipitation falls in the month of June in the form of rains, but then comes hot and dry weather, usually continuing until late autumn. The maximum air temperature reaches 43^{0}C in July, sometimes in August.



METHODS

When conducting field and laboratory experiments, phenological observations, biometric measurements and determining the yield, we were conducted by the methods "Methodology for state variety testing of agricultural crops", "Methodology for conducting field experiments", "Research work in crop production". Statistical processing of the data obtained was carried out according to the method of B.A.Dospekhov.

The data on field germination of seeds, stages of development, height of stems, leaf area, yield and oil content of seeds of local varieties "Tashkent-112", "Kibray-4", "Salomat" and "Mumtoz", sown in 4 dates as the main culture: 15.04; 04.25; 5.05; 15.05.

The following phenological observations, calculations, laboratory analyzes were carried out in the experiment:

1.The degree of germination of seed. 2.The number of grasses, seedling thickness per 1 m^2 was determined at 3 points of all options. 3.Phenological observations were made on the stages of development. 4. The height of the stem of peanut according to the options; the number of grains per plant; seed weight per pod; Weight of 1000 seeds. 5.At the time of harvesting, 1 m^2 of peanut was harvested from 3 points of repetition of all variants in the experiment. 6.Technological quality indicators of grain (samples were delivered to a special laboratory) were determined. 7.In the mathematical analysis of the yield of peanut grain and hey, B.A.Dospekhov's (1985) multiply factory field experiments used the method of variance analysis based on randomized returns [6].

RESULTS AND DISCUSSION

At different planting dates of the "Tashkent-112" variety (control) as the main crop, the number of seedlings, respectively, was 101.4-115.7-119.9-119.6 thousand pieces / ha, and for the "Kibray-4" variety these indicators were higher by 4.3-2.9-7.2-4.3 thousand pieces / ha, for the variety "Salomat" by 2.9-1.4-2.9-1.4 thousand pieces / ha, for the "Mumtoz" variety by 4.3-5.7-7.1-7.2 thousand pieces / ha in comparison with the control.

In experiments, the leaf area of peanut varieties was determined by the weight method according to A.Nichiporovich. The sowing date influenced the formation of the number and area of leaves of one plant. When local varieties were sown on May 5, the leaf area of the Tashkent-112 variety was 36.1 thousand m^2 / ha, while the Mumtoz variety is 6.0 thousand m^2 / ha more. The largest number of leaves at the first sowing date in the order of varieties was 103.4; 122.6; 112.5; 127.8 pieces / plant, the productivity of photosynthesis during this sowing period was the highest and amounted to 3.15 for varieties, respectively; 3.91; 3.56; 3.94 g / m^2 per day.

A significant influence of different sowing dates of peanuts as a second crop on the leaf surface area was revealed. For example, when sowing the "Tashkent-112" variety on June 5, the leaf surface area was 32.5 thousand m^2 / ha, the Salomat variety increased by 0.9 thousand m^2 / ha, and the Kibray-4 and Mumtoz, on the contrary, is less by 1.9 and 1.1 thousand m^2 / ha.

TABLE 2 INFLUENCE OF SOWING DATES ON BIOMETRIC INDICATORS OF PEANUT VARIETIES (2009-2011YEARS)

№	Varieties	Number of grains per plant, pieces			amount ripe grains, %	The mass of beans on one plant, g	Weight of grains per plant, g	Kernel output, %	Weight of 1000 seeds, g
		matured	immature	total					
1st sowing date -15.04									
1	Tashkent-112 (control)	22,0	6,0	28,0	78,6	18,64	13,18	70,7	416,5
2	Kibray-4	20,0	4,3	24,3	82,2	24,18	17,49	72,3	751,4
3	Salomat	18,0	4,0	22,0	82,0	22,65	16,62	73,3	511,3
4	Mumtoz	20,3	5,3	25,7	79,2	23,82	16,84	70,6	625,7
2nd sowing date - 25.04									
5	Tashkent-112 (control)	21,7	5,3	27,0	79,9	20,80	14,32	68,8	415,4
6	Kibray-4	22,3	4,3	26,7	83,8	25,32	18,44	72,8	750,1
7	Salomat	21,0	4,0	25,0	84,1	24,02	17,71	73,7	509,3
8	Mumtoz	21,7	5,7	27,3	79,3	25,62	18,40	71,8	623,9
3rd-sowing date - 05.05									
9	Tashkent-112 (control)	18,7	5,3	24,0	77,8	22,54	16,10	71,4	413,5
10	Kibray-4	24,0	5,7	29,7	80,9	25,77	18,85	73,1	748,4
11	Salomat	22,7	5,0	27,7	81,9	25,20	18,54	73,6	507,6
12	Mumtoz	24,0	6,3	30,3	79,1	27,07	19,52	72,1	621,9
4th-sowing date -15.05									
13	Tashkent-112 (control)	14,7	5,7	20,3	72,1	21,67	15,46	71,3	413,1
14	Kibray-4	20,3	6,3	26,7	76,3	25,45	18,60	73,1	747,8
15	Salomat	18,7	5,3	24,0	77,8	24,89	18,30	73,5	506,8

16	Mumtoz	21,7	6,7	28,3	76,5	26,24	18,96	72,3	621,2

Peanuts are nutritious foods that contain more than 30 vitamins, minerals and phytonutrients. In fact, one ounce of dry-roasted unsalted peanuts has 2.3 grams of fiber, 7 grams of proteins that satisfies and are a good source of folate (the naturally occurring form of folic acid); niacin, and manganese. And, like all plant-based foods peanuts are naturally trans-fat and cholesterol-free with 12 grams of unsaturated (good) fat which has been shown to have heart protective benefits. As part of a crop rotation program, peanuts can help to enrich the soil. Peanuts are legumes and are able to fix nitrogen in their roots. When peanut plants are tilled back into the soil, nitrogen improves the soil for other crops such as cotton or wheat, which require nitrogen to grown well. [14].

Number of nuts per plant in the variety "Tashkent-112" during the first sowing (15.04): a total of 28 legumes were formed, of which 22 were ripe, 6 unripe, the amount of ripe nuts - 78.6%, the productivity of one plant in the most modern electronic scales When the amount of seeds was determined, the average yield of seeds was 70.7%, and when measuring the weight of 1000 seeds on modern electronic scales, it was 416.5 g. During the first sowing (15.04) of “Salomat” variety, the minimum number of nuts per bush was observed. It was noted that the control of this variety was 6 in comparison with the variety of "Tashkent-112", and 3.7-2.3 in the varieties "Kibray-4" and "Mumtoz" in comparison with the control.

In peanut varieties, the formation of the largest number of pods in terms of sowing was observed during the third sowing (05.05). The total number of pods in the control variety “Tashkent-112” was 24, while the total number of pods in the varieties “Qibray-4” and “Mumtoz” was 5.7 and 6.3, respectively. During the first sowing (15.04) the amount of nuts delivered in the sequence of varieties was 78.6-82.2-82.0-79.2%. During the fourth sowing period (15.05), the amount of ripened nuts decreased by 6.5-5.9-4.2-2.7% compared to the first sowing period. It can be seen that some biometric indicators were higher than in other periods due to the fact that the praxis period of local peanut varieties in the first planting period coincided with hot days, as well as the low number of plant bushes per hectare at the end of the application period.

According to the experimental data, in the early sowing of the first sowing (15.04) in the experimental variety "Tashkent-112" in the years of the experiment harvested 18.4-19.1-18.8 c / ha of pod, the highest yields were obtained by "Kibray". -4 ”variety (26.0-26.8-26.5 c / ha).

Peanut oil obtained by cold pressing is used for medical treatments. Peanut oil is the basis for many therapeutic preparations. It has skin softening properties. Peanut oil is also edible and can be used in the kitchen. Peanut oil is used to cure Catarrh of The Bladder or Cystitis (pain and tenderness in the region of the bladder) [8].

Peanut cake or peanut oil meal is rich source of proteins which are crude proteins. These crude proteins are used as cattle feed or as raw material for the preparation of protein isolate [9].

In the mathematical analysis of the results obtained, the presence of a weak correlation between the yield of beans and the oil content of seeds of peanut varieties was determined at different sowing times (r=0.252).

The yield of peanut grain sown as the main crop, depending on the sowing time, was different; 8 c / ha, varieties "Salomat" 39.0 and varieties "Mumtoz" 34.5 c / ha. The optimal time for sowing

peanuts as a second crop is June 5, where the yield of beans of the "Tashkent-112" variety was 22.1 centners / ha, the yield of beans for the Salomat variety was 1,4 centners / ha higher.

TABLE3 THE EFFECT OF SOWING DATES ON THE YIELD AND OIL CONTENT OF PEANUT VARIETIES PLANTED AS THE MAIN CROP

№	The name of varieties	Yield, c/ha	Difference on sowing dates, c/ha	Yield of hay, c/ha	Difference on sowing dates, c/ha	The amount of oil in the seed, %
1st sowing date -15.04						
1	Tashkent-112 (control)	18,8	-	28,3	-	50,5
2	Kibray-4	26,4	-	39,5	-	48,0
3	Salomat	23,2	-	35,4	-	49,5
4	Mumtoz	24,9	-	37,7	-	47,7
2nd sowing date - 25.04						
5	Tashkent-112 (control)	23,9	5,1	34,3	6	50,7
6	Kibray-4	30,7	4,3	43,8	4,3	48,3
7	Salomat	28,1	4,9	40,9	5,5	49,8
8	Mumtoz	30,9	6	45,0	7,3	47,9
3rd-sowing date - 05.05						
9	Tashkent-112 (control)	27,0	8,2	38,0	9,7	51,4
10	Kibray-4	33,8	7,4	47,0	7,5	48,8
11	Salomat	30,9	7,7	43,6	8,2	50,4
12	Mumtoz	34,5	9,6	48,7	11	48,6
4th-sowing date -15.05						
13	Tashkent-112 (control)	26,0	7,2	36,0	7,7	51,1
14	Kibray-4	32,4	6	45,1	5,6	48,5
15	Salomat	30,3	7,1	42,4	7	50,2
16	Mumtoz	33,2	8,3	46,4	8,7	48,3
			2009 йил $НСР_{05}$ = 0,02 ц/га; $НСР_{05}$ = 1,0%			
			2010 йил $НСР_{05}$ = 0,02 ц/га; $НСР_{05}$ = 0,8%			
			2011 йил $НСР_{05}$ = 0,03 ц/га; $НСР_{05}$ = 1,1%			

The increase in pod yield during the second sowing period is shown datain Table 3. Yields of legumes in the variety "Salomat" for the years amounted to 27.5-28.7-28.1 c / ha. It was noted that this figure is 3.9-4.4-4.2 c / ha higher than the control option, but on average 2.5-2.8 c / ha lower than the Kibray-4 and Mumtoz varieties.

Pod yield was highest during the third sowing period (05.05). During this sowing period, the highest yield was observed in the “Mumtoz” variety. According to the experimental years, the average yield of legumes in the variety "Mumtoz" was 33.8-35.2-34.6 c / ha. In the "Salomat" variety it was 30.3-31.6-30.9 c / ha. When analyzing the yield of legumes in the variety "Kibray-4", it was noted that the average yield of legumes was higher than in the varieties "Tashkent-112" and "Salomat" (33.2-34.5-33.8 c / ha).

CONCLUSION

According to the analysis of data on yield elements, the highest biometric values were observed during the third sowing (05.05) in the variety "Mumtoz". Productivity in a plant was 2.66 g compared to control option, weight of pods in a plant was 3.42 gr, karnel output was 0.7 % and the weight of 1000 seeds was 94.1 grams higher.

The highest yield of hay in local varieties of peanuts, depending on the yield of beans, was obtained when planting on May 5-15, where the yield of hay of the “Tashkent-112” variety was 36.0-38.0 centners / ha, the “Mumtoz” variety 46.4-48,7 c / ha or more by 10.4-10.7 c / ha.

In the conditions of typical sierozem soils of Tashkent region, sowing of peanut varieties as the main crop in the first ten days of May was determined as the most optimal sowing period.

It is recommended to sow late-maturing, high-yielding varieties “Kibray-4” and “Mumtoz” as the main crops.

REFERENCES

1. AtabaevaKh.N. Khudaykulov J.B. Peanut. Monograph.Tashkent, 2019, p.144.
2. Amanova M., Rustamov A., Allanazarova F. and KhudaykulovJ. Growing technology of peanut in Uzbekistan. Recommendation.Tashkent-2016, p.5-14.
3. Canavar O., Mustafa Ali. Effect of different planting dates on yield and components of peanut (*Arachishypogaea*L). Article in Turkish Journal of Agriculture and Forestry, April 2008. 32(2008) 521-528.
4. KarraGeetha, NadenlaRamarao, R. ShireeshKiran. An overview on *Arachishypogaea*plant. International Journal of Pharmaceutical Sciences and Research. *Geetha et al., IJPSR, 2013; Vol. 4(12):P.4508-4518.* E-ISSN: 0975-8232; P-ISSN: 2320-5148.
5. Peanut (groundnuts with shell) production in 2018". FAO Stat, Food and Agricultural Organization of the United Nations, Statistics Division. 2019. Retrieved October 3,2020.
6. Dospekhov B.A. ***Field experiment technique***. M.Kolos. 1983.P.416-425.
7. Prasad, P.V.V, P.Q., Craufurd and R.J. Summer field. 2000. Effect of high air and soil temperature on dry matter production, pod yield and yield components of peanut. Plant and Soil. 222. P.231-239.
8. Indian Material Medical, volume 2, p. 121-123
9. http://www.cricketfundas.com/health-fundas/ground-nut-oil-arachis-oil-preparation-chemical-constituents-and-uses/52791/ last accessed on 11 October 2013.
10. .http://www. FAO. 2019. Statistics.
11. www.factishPeanuts,production in the world countries.
12. New world encyclopedia. http://www.newworld encyclopedia.org/entry/Peanut. Last accessed on 11 October 2013].
13. Jenn Schanz: Uses for peanut plant : http://www.ehow.com/list_6580849_uses-peanut-plant-roots.html. last accessed on 11 October 2013.
14. Kylenorton: The World Most Healthy Foods – Nuts & Seeds – Peanuts (Arachishypogaea) Health Benefits and Side Effects. http://kylenorton.healthblogs.org/2011/ 12/29/the-world-most-healthy-foods-nuts-seeds-peanuts-arachis-hypogaea-health-benefits-and-side-=87ffects.