



Research Paper

Comparison of the quantitative and chemical characteristics of the three varieties of Peanut (*Arachis hypogaea* L)

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The experiments of this study were conducted at the region of debila El-Oued during the agricultural season 2016. The objective of this study was to determine the effect of the number of seeds in fruit on the growth vegetative and productivity, chemical composition food of three varieties of peanuts (*Arachis hypogaea* L). The experiment was arranged as a split plot in a Randomized Complete Block Design (RCBD) with three replicates. The results showed that there was no significant effect of the difference in the number of seeds in fruits to the ratio of dry matter in fruit and the average number of fruits in the plant of the three varieties. The results showed that the superiority of variety

(02) was no significant in the number of seeds in fruits and the superiority of variety (01) was significant in productivity and variety (03) was significant in the ratio (weight seed / weight fruit). The results also showed that variety 03 is superior in food composition content, where protein content was estimated at (11%), sugars (1.5%) and Fat (57%). The results showed moderate acidity (7.04 - 7.12) and low salinity (1 - 1.5) in the water extract of the seeds of all varieties.

Key words: Peanuts, productivity, food composition, growth, varieties.

INTRODUCTION

Comparative study of the quantitative and chemical characteristics of three classes of Peanut *Arachis hypogaea* L. The use of the scientific method in the agricultural sector is essential for the achievement of development and for the provision of sufficient productivity of crops with good chemical quality, specially the peanut crop (*Arachis hypogaea* L). Generally, Peanut is used in the nutrition for its richness with oil that reaches up to 50% on average. Sometimes to 60% in

Some times to 60% in some of its items and for its proteins which exceeds 35% carbohydrates, minerals and fibers (Hamdalla et al., 2014). Also, It is one of the most important family, It is grown for the purpose of oil and protein. (Intsar et al., 2015), Another importance of peanut has been attributed to improving soil properties by forming the bacterial nodes of the rhizobium which fixes atmospheric nitrogen in the soil. It is an important crop in agricultural cycle applications. Peanut growing areas are

found in the tropical and subtropical climate zones of the world (Where heat systems are suitable for both vegetative and fruit growth) (Caliskan et al., 2008), Where its seeds are used either directly for human consumption or exploitation (Al-Kaisy and Al-Izzy, 2010). Three types of peanuts are determined according to the number of seeds, which are related to the varieties according to the position of the aerial part. Ahmed and Zeidan (2001) noticed that the varieties of peanuts differ significantly in the productivity of both pods, seeds and production properties. Abd- El-Motaleb and Yousef, (1998) found that the existing variety of peanuts is superior to the similarity in the height of the plant and the weight of seed and fruit productivity in the unit area.

Several studies were carried out to assess the different varieties, showing rates and line spawning of cultivated peanuts in different regions to find the best seed rate and the seeding dimension in order to select peanut varieties for cultivation. Selection of high-yielding peanut varieties is important in breeding programs to improve the economic value of this crop. The purpose of this research is to evaluate the peanut varieties grown in the Algerian region and to identify some its quantitative and chemical properties.

MATERIALS AND METHODS

The experiment was carried out using the design of complete random segments (RCBD). We used three treatments according to the number of seeds in the fruit (one seed, two seeds, and three seeds), each treatment consisted of a trial plot measuring an area of 1.08 m². The experimental plot contains 4 rows for planting in sandy soils with organic fertilizers, acidity (pH=7.83) and electrical mobility (CE= 0.946). Fruit was harvested after four months of farming, selection of three bushes from each experimental unit randomly to study (the percentage of seeds per fruit, average number of fruits in plant and productivity). The chemical properties under investigation include:

Determination of pH

Total acidity of the samples was measured by Marx (1999) using a pH meter device.

Determination of the electric conductivity (EC)

Electrical conductivity was measured according to the method of (Jones, 2001) using a conductive meter device.

Determination of food content

Extraction of primary metabolic products

Primary metabolite products were extracted according to

Shibko, (1966) method which is based on 20% TCA use.

Quantification of proteins

The amount of proteins found in the fruits of different peanut varieties was estimated by Lowry, (1951), using BSA as a standard protein.

Quantification of carbohydrates

The method has been relied upon (Dubois 1956) in estimating the total sugar content which is mainly based on concentrated sulfuric acid, glucose was used as a standard solution to calculate the amount of sugars found in peanut varieties.

Determination of quantitative content of fat

Depending on the (Goldsworthy *et al.*, 1972) method in estimating the sinter using the Sulphosphovanilique detector and the use of soybean oil as a standard solution through which the curve of the standard was drawn and then the content of the sludge in the peanut varieties was estimated.

RESULTS AND DISCUSSION

Number of fruits in plant

The results shown in the (Figure 1) indicate that the number of fruits is not affected by the change of varieties. No significant differences between the three varieties of peanuts. An increase in the fruits number average per plant for the variety (02) reached 39.66 fruit. This superiority is due to the combining of the morphological and genetic characteristics of variety (01) and (03) which distinguish the classes (02) called a semi-existing and half-prey exploits class. It is used the environmental factors to increase the formation of fruits par plant, therefore largest number of seeds. The average fruits number by plant ranges between 37.33-39.66. This is due to the similarity of the genetic characteristics of the species (Shaimaa *et al.*, 2015). The ability to respond to fertilization also plays an important role in the formation and maturity of fruits (Iman et al., 2014).

Average dry matter ratio in fruits

The results of (Figure 2) indicate that the fruit dry matter rate of three varieties studied was 38.94 to 45.45% with significant differences between the three varieties. This convergence of the dry matter percentage due to the difference in the number of seeds of the fruit which increases the quantity of the dry matter of the variety (03)

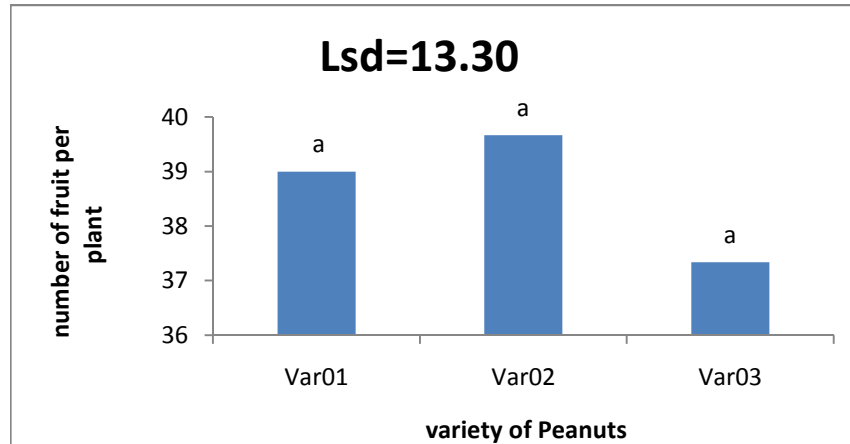


Figure 1. Mean number of fruit per plant in the three varieties of Peanuts.

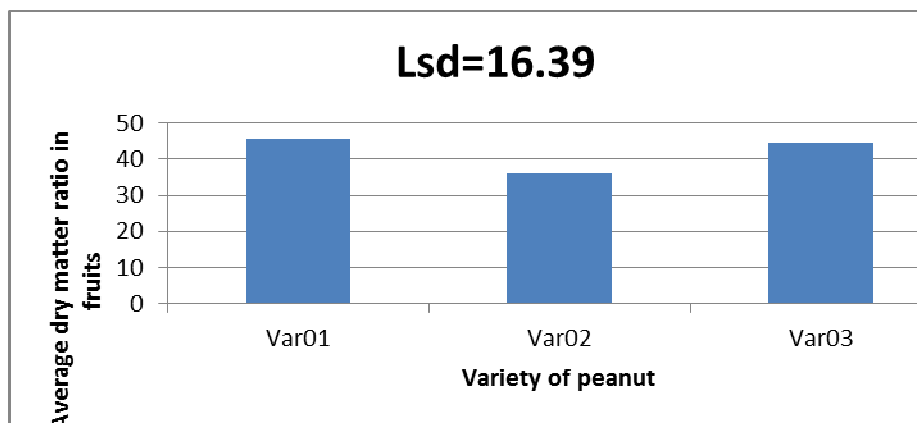


Figure 2. Mean Average dry matter ratio in fruits in the three varieties of Peanuts.

and the vegetative position of the plant which makes it retain more water from the Variety (01). The effect of the compost added by the variety can also have an effect on the proportion of dry matter in peanut fruits (Mohamed *et al.*, 2013). These results are consistent with the results of (Konlan *et al.*, 2013) who explained the difference in dry matter ratio to groundnut varieties grown in Ghana by photosynthesis rate.

Average productivity

The production ratio varies in the three varieties (Figure 3), a significant difference of variety (01) on variety (03) without variety (02). This difference in production is due to the physiological characteristics of the plant and the photosynthesis associated with the size and position of the aerial part. These factors increase the absorption of mineral elements dissolved in soil and increase the production of organic matter, which is reflected in the increase in fruit size and weight in addition to the amount of fruit and dry matter (Mohamed *et al.*, 2013). The

amount of nitrogen fixed in the roots plays an important role in the difference in productivity of 12 varieties of peanuts planted in the Congo (Konlan *et al.*, 2013).

Chemical properties and nutritional value

Results of pH and electrical conductivity

The results indicated in (Table 1) shows that the acidity is moderate to the extracts of the three varieties and restricted between (7.04-7.12). There is a great convergence of the three types of pH. This convergence is due to the adaptation of varieties to the broad range of natural and terrestrial factors (Caliskan *et al.*, 2008), which results in increased formation of raw materials such as sugars, proteins and acids which in turn affect the value of pH, These materials decrease during maturity rather than build where they turn into simple materials which reduces the acidity of the fruits and increase the value of pH (Tombesi *et al.*, 2005). As proved (Yurtseven *et al.*, 2005) the pH difference is due

Variety Characteristic	Var01	Var02	Var03
PH	7.04	7.10	7.12
(ms/CM2)EC	1.540	1.480	1.059

Table 01: mean Results of pH and electrical conductivity in three variety of Peanuts.

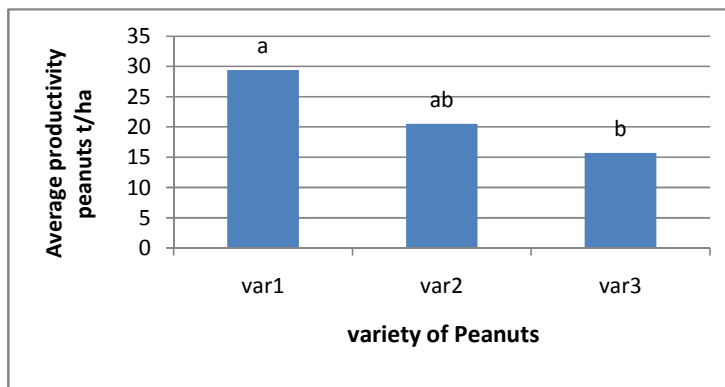


Figure 3. Average productivity in the three varieties of Peanuts.

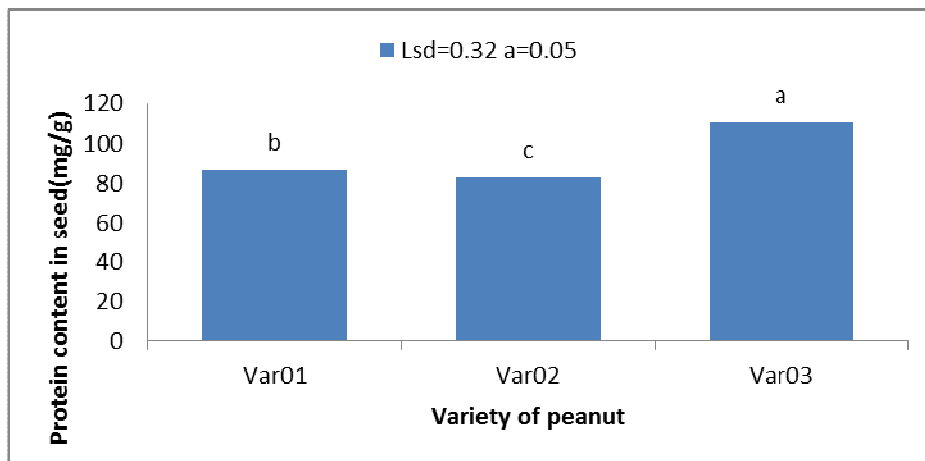


Figure 4. Mean Protein content in three varieties of Peanuts.

to climatic factors, precipitation, watering and fertilization. As for the electric mobility, we also note that the values of the three types of fruit ranged from 1.540- 1.059 mmo/cm so these varieties are genetically close in this capacity and are low salinity (Scalzo et al., 2005).

Protein content in seeds

The results of (Figure 4) indicated that the protein ratio in seeds is very high, and vary according to category, where class (03) significantly exceeded other varieties. The protein content was 110.85 mg/g, While class (02)

showed the lowest protein content compared to the remaining class of 82.93 mg/g, while the amount of protein in class 1 was 86.65 mg/g, We explain the high protein content of the studied varieties of peanuts because they are known to be rich in proteins (Annerose, 1990; Gulluoglu et al., 2016).The reason for the significant increase in protein at class (03) can be attributed to its predatory roots, which contain a large number of bacterial nodes which gives it the efficiency of absorption and high nitrogen uptake, where nitrogen dissolved in soil solution plays an important role in improving protein content in peanut seeds (Yousef et al.,

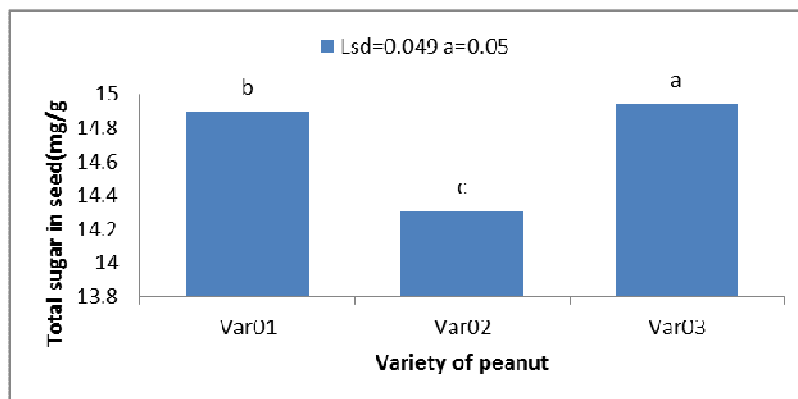


Figure 5. Mean sugar content in three varieties of Peanuts.

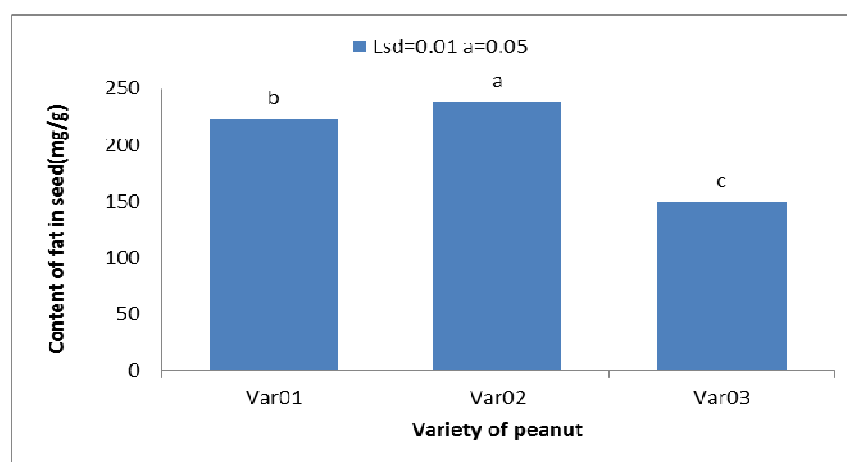


Figure 6. Mean fat content in three varieties of Peanuts.

2015). The content of seeds of peanut varieties is also influenced by environmental factors, the most important being the temperature during fruit ripening (Dwivedi et al., 1996). Asibuo et al.,(2008) returns the difference in the chemical content of some varieties of peanuts to different genetic composition. These results correspond to the results (Amiry et al., 2009) by studying the effect of different soybean varieties on the protein content of seeds, and what was conducted by (Sahi and Luma, 2006) through their study on the protein content of some dates.

Total amount of sugars in seeds

The results of the (Figure 5) indicate that there were significant differences in sugar content among the studied cultivars, (03) showed a significant increase in the other two varieties with a value of 14.94 mg / g. The cultivar (02) had the lowest sugar content at a value of 14.30 mg / g. This variation is explained by the extent to which the

variety is affected by climatic factors such as temperature and light associated with photosynthesis rates and thus the construction of sugars. As we explain the superiority of variety 03 by containing the Furnished roots in the plant that works to absorb more mineral elements that contribute to the revitalization of the plant's vital processes and the increase in the composition of carbohydrates, These results are consistent with the findings of (Asibuo et al., 2008) It is the difference in the amount of sugars dissolved in 20 varieties of peanuts, as here turned by (Chowdhury et al., 2015).The difference in the amount of carbohydrates in their study of five varieties of peanuts to the effect of natural factors and the way of agriculture as well as genetic factors.

Quantity of fat in seeds

Peanut seeds are a high-fat seed (Sheppard and Rudolf, 1991), (But they differ from one species to another depending on the genotype, climatic conditions, geographical location and growth conditions associated

with the composition of fat content in oil seeds (Gulluoglu et al., 2016). The fatty content of peanut seeds is related to the date of cultivation(Tahsin et al., 2016) . This is what the results of (Figure 6) shows. Peanuts are rich in fat, giving them high nutritional and health value (Noba et al.,2014). The results showed that the amount of fat was different depending on the class. The class gave (02) the largest amount of fat in comparison with the lowest fat percentage in class (03). These results are in line with the findings of Chaiyadee et al.(2013)which state that the difference in fat content is due to differences in genotypes and climatic factors, which also correspond to the results of faddal et al., (2010) in study of some chemical properties of local and imported wheat varieties.

Conclusion

Results of this study showed that, based only on study parameters, That the first variety(01) was the best in Average dry matter ratio in fruits and productivity, while the second variety (02) superiority in the number of fruits in the plant and the fat content , the third variety(03) was superiority in content the food composites, Where protein content was estimated at(11%), and sugars (1.5%). Fats(57%), and the results showed convergence of the three categories in the values of acidity and electric conductivity In addition to dry matter content for fruits.

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