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EVALUATION OF CAMELS, SHEEP AND CHICKEN MANURES INFLUENCES ON GROWTH AND FRUITS QUALITY OF OLIVE TREES IN AL JOUF REGION, SAUDI ARABIA

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ABSTRACT: A Effect of Camel manure on growth and fruit quality of 15 years old Nepal olive tree was evaluated and compared with sheep and chicken manures as natural fertilizers .This research was carried out during December, 2015 till January 2016.Landscape for this research is divided into 14 squares with planting density 20 trees in each square; the distances between squares were 15 meters under regular drip irrigation system and without any chemical fertilizers or pesticides additions. According to the obtained results, the shoot growth rate(cm), fruit yield, fruit physical characteristics (length (cm), diameter (cm), weight (g), volume (cm), flesh weight (g) and oil percentages were significantly increased affected by camel manure utilization compared to sheep and chicken manures.
Key word: Camels, Sheep, Chicken Manures, Olive, Al-Jouf.

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INTRODUCTION

Sandy soils are used in agriculture in many regions of the world. [1] Out of the eight exotic olive cultivars grown in Saudi Arabia, one was Greek, five were Spanish and two were Syrian in origin [2] olive trees are known to require essential minerals at levels comparable with those of other fruit trees. [3] Olive trees fertilization do not need special olive tree fertilizer but a lot of organic fertilizer used by many growers. Organic matter is essential for plant production system. Several studies have been conducted on major constituents of manures. Manures are considered unavoidable waste that has potential value. [4] Manure is organic matter derived from faces of camel, horse, sheep, poultry and even human, characterized by its effects on growth and productivity of plants and used traditionally for soil fertilization. Manures contain high organic matter and nitrogen contents and significant amounts of other plant nutrients. [5] The Ministry of Agriculture in Saudi Arabia estimated around 830,000 heads of camels, so the camel population is 51% of the total tropical livestock unit (TLU) in the country. The camel population is increasing approximately a growth of 5.2%/year, [6] and on this, there is a large amount of camel manure accumulates in Al Jouf region. Fertilization of Olive trees by manures have a positive effect on leaf content of chlorophylls, N, P, K, Ca, Mg, Fe, Zn, and Mn. [7] Utilization of suitable manure is a very good practice in improving physiochemical properties of the soil; it is also a good source of essential nutrients. [8] The productivity of olive tree depends on the manures properties that vary in the chemical constituents. The present study was aimed to evaluate the fertilization with different manures to maximize the productivity of olive trees.

EXPERIMANTAL

Study area

Al-Jouf province is located in the northern part of Saudi Arabia, where it is bounded from the north and east by the Northern Borders province and from the south by Hail and Tabuk provinces and delimited from the north and west by Jordan

Soil analysis

Chemical analysis was measured before addition of different manures. Physiochemical characteristics of the vegetation was summarized in Table 1. These results were approximately similar to those obtained Al-Hassoun, and Gomaa [9, 10].

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Manure sampling

Five random samples were taken from different locations combined and immediately freeze to preserve the composition of the manure and sent to the laboratory for analysis Sampling of manure was done according to Zhang by scooping from four random spots on the manure heap to a depth of about 30 cm. [11] The five samples were mixed together and representative sub-samples of approximately 0.25 kg were taken and stored in a plastic bag. The manure samples were kept in a cool box with ice cubes during transportation and then stored in a deep-freezer before analysis of N, P and K.

Chemical analysis of manure

Total nitrogen of manure was determined by the micro Kjeldahl digestion (using 0.5g fresh manure sample), distillation and titration method. Total phosphorus and potassium were determined by dry ashing method as described by Juo. [12] Organic carbon was determined by Walkley- Black method. [12] The dry matter content of the manure was obtained by oven drying a sub-sample at 105 ^{o}C for 24 hrs. Carbon -Nitrogen ratio was computed by dividing the amount of carbon to that of nitrogen. Calculations were made on dry matter basis.

Treatments by different manures

Landscape for this research is divided into 14 squares with planting density 20 trees in each square, the distances between squares were 15 meters under regular drip irrigation system and without any chemical fertilizers or pesticides additions. Addition of different amounts by kilograms of the manure (camel, sheep and chicken) to each tree at beginning of December 2015 and in October 2016 whereas the control without any treatment. The growth rate measurement of the buds growth by centimeter as shoot system, starting at March until May. Five trees and five buds of each tree were selected randomly for this purpose.

Estimation of olive fruits at middle of October 2016. Fruiting Calculations: For fruit quality thirty fruits per replicate were randomly picked to determine weight of whole olive fruit in grams, seed size length (cm), fruit diameter(cm), fruit shape (L/D ratio), fruit weight (g). Oil percentages was analyzed using the protocol given by AOAC (2000). [13]

Statistical Analysis

All analyses were carried out in triplicate and the results were subjected to statistical analysis using Duncan multiple test range and Analysis of variance (ANOVA). The results are presented with their means and standard deviation**.**

RESULTS AND DISCUSSIONS

Soil analysis

Chemical analysis was measured before addition of different manures. Physiochemical characteristics of the vegetation area are summarized in Table 1. Of the measured soil parameters, silt is 16.5%, clay 5.2% , sand % fine , coarse and medium sand (78.3%) pH is 7.8 value).N% was 1.7, P was 0.492% and K was 0.398% whereas CaCo3was 3.1%These results are approximately similar to those obtained Al-Hassoun, and Gomaa [9, 10].The most important macro nutrients are N, P and K for plant growth. According the results have been obtained nitrogen content of the soil was 11.7 mg/kg, phosphorus was 16.4 mg/kg whereas potassium content was 141 mg/kg.

Chemical characters of used manures

In this research experiment was carried out to compare the concentrations of total N, total P, total K, Ca ,Mg, Fe, Mn In camel, sheep and chicken manure. Table 2 shows some chemical characters of used manures, camel contains high percentage of organic matter around 44. 51 % followed by sheep 37.05% and chicken was 36.53%. On the other hand total N% exhibited higher in camel manure than sheep and chicken manures, whereas total P% exhibited higher in chicken manure. K% exhibited higher in camel manure than sheep or chicken manures. Potassium fertilization is considered essential in olive, particularly because K is found in high concentration in the fruit. [14] On the other hand, camel manure had higher total Ca , Mg, Fe, Mn and Zn values than sheep and chicken manures. Highest percentage of total potassium indicate that K more stable in camel manure than other manures. Potassium is vital to many plant processes but does not become a part of the chemical structure of plants, it plays many important regulatory roles in development of olive tree, also it increases crop yield and improves quality.

The quantity and form of N, in particular, present in manure effect on the quality of the material. [15] Chemical composition of manures affected by animal nutrition. Sutton and Lander showed that, reducing nutrients or selecting more efficient feed nutrient sources and/or feeding techniques can significantly reduce the nutrient content of excreted manure. [16] The amount of manure produced by animals is very variable, even within species, partly due to differences in dry matter content of the manure. As water is not a very interesting component, we will be dealing mainly with the dry matter (DM), the organic matter (OM) and the nutrients N and P .Müller gives manure production specifications for different animal species in different regions of the world . [17]

Table 1: Some physical and chemical characteristics of sandy soil used for the present study

Parameters	Value	Parameters	Value
Sand %	78.3±3.21	Available nutrients mg/kg	
Silt %	16.5±4.12	N	11.7±1.13
Clay %	5.2±0.65	P	16.4±0.67
Textural class	Sand	K	141±4.16
pH	7.9±0.89	$CaCO_3$%	3.1±0.11

Table 2: Some chemical characteristics of the used organic manures

Parameters	Camel	Sheep	Chicken
Moisture %	10.2±0.89	12.3±0.12	14.1±0.62
Organic matter %	44.51±1.14	37.95±1.6	36.53±3.15
pH	7.33±0.62	7.27±0.98	7.08±0.12
Total N%	2.37±0.04	1.83±0.03	1.42±0.03
Total P%	0.49±0.01	0.76±0.01	0.97±0.04
Total K%	1.14±0.02	0.97±0.02	1.22±0.01
Total Ca %	1.95±0.03	1.25±0.04	1.71±0.02
Total Mg %	0.98±0.04	0.61±0.02	0.57±0.01
Total Fe (ppm)	233±5.12	277±4.19	250±3.15
Total Mn (ppm)	688±7.16	81±1.7	44±1.12
Total Zn (ppm)	415±9.14	77±1.6	38±2.13

Vegetative growth of shoots

In Tables 3 and Fig 1 illustrate that vegetative growth of shoots per twig, were significantly increased by different organic manure. However, Camel manure gave the highest values in this respect, followed in a descending order by sheep, chicken manures and control without any treatment

Table 3: Effect of different manures treatment on Shoot growth (cm)

Month	Days	Camel	Sheep	Chicken	Control	Mean
March	3	0.78	0.36	0.32	0.28	0.44L
	14	1.07	0.52	0.35	0.29	0.56K
	20	1.92	1.15	0.38	0.39	0.96J
	26	3.03	2.06	1.08	1.12	1.82I
April	4	3.83	2.65	1.58	1.65	2.43H
	12	9.24	5.12	3.86	2.38	5.15G
	23	23.01	15.84	7.92	6.44	13.30F
	30	34.85	25.38	12.82	10.18	20.81E
May	3	39.35	31.08	16.64	12.19	24.82D
	12	43.71	35.74	21.95	13.73	28.78C
	22	46.89	36.99	25.25	15.40	31.13B
	30	50.09	42.86	28.74	17.53	34.81A
Mean		21.48A	16.65B	10.07C	6.80D	

F-test, Manures (a)= 14.12** , Days (b)= 9.85**, A x B =7.65**

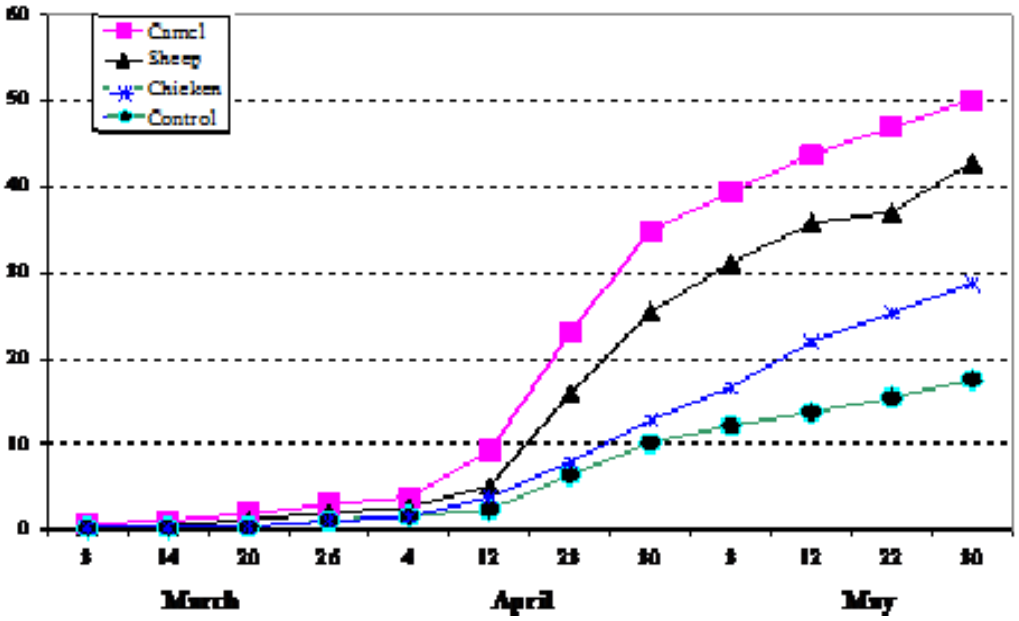


Fig-1: Effect of different manures treatments on Shoot growth (cm)

Fruit Quality

Statistical studies of the results of olive fruits fruit set, yield, fruit physical characteristics (length (cm), diameter (cm), weight (g), volume (cm), flesh weight (g) and oil percentages indicated that do significantly different at 0.05 level of probability. Table 4, fig 2 and fig 3 show that the treatment with camel manure gave the highest yield per tree, olive fruit size and flesh per pit ratio compared with sheep and chicken manures. Fayed T.A. resulted that chicken manure gave the highest values of all vegetative growth parameters including growth rate of trunk diameter (cm/year), number of the newly formed shoots per twig and its length (cm), number of leaves/shoot [18] leaf area (cm), and he concluded that the positive effects of different organic manures used in improving the studied olive cultivars properties may be attributed to their high supply of nutrients and organic materials to olive trees. Thus, this led to higher olive trees growth, nutrient content, C/N ratio, flowering characteristics, fruit set, yield, fruit properties and oil chemical properties. The highest vegetative growth and physical fruit properties of olive trees were obtained with Camel manure followed by sheep then chicken manures. There are negatively relation between fruit number and size but not in hundred percentage. [19] This is due to changes in the mesocarp fresh weight, while the pit weight is only moderately affected by the fruit load. [20] Proietti et al. evaluated the effect of leaf-to-fruit ratios on fruit growth in olive. [21] They reported that all fruit growth phases was affected by the availability of assimilates, but the greatest effect of leaf area available to the fruits was observed at the beginning of fruit growth. When animal manure is left in the open air as most farmers do, it may lose most of its potassium and some of its phosphorus but much of its nitrogen and varying amounts of other nutrients are lost through volatilization and leaching. [22]

Table 4 : Effect of different manures treatments on fruit quality*

Treatment	Yield/Tree (kg)	Fruit length (mm)	Fruit diameter (mm)	Fruit weight (g)	Pit weight (g)	Flesh/Pit	Oil percentage %
Camel	55.0A	21.71A	16.14A	3.91A	0.69B	5.66A	37.36A
Sheep	30.0B	20.78B	15.98A	3.75A	0.71B	5.28A	34.21B
Chicken	20.0C	20.66B	15.94A	3.59B	0.72A	4.78B	32.74C
Control	15.7D	20.65B	15.92B	3.09B	0.75A	4.29B	31.44D

*Yield (kilogram per tree) and other fruit characteristics using camel manure show statistically highly significant value: ($p<0.01$) (F-test-13.65)

A1

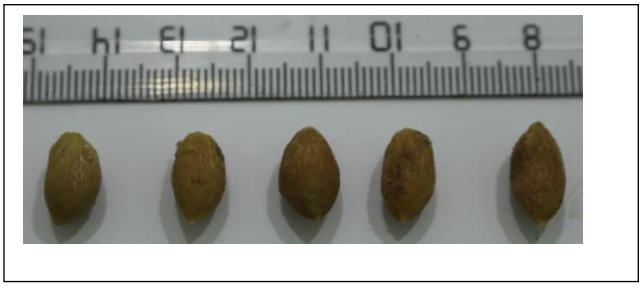
A2

A3

A1 –A2–A3 :Chicken

B1

B2



B3

B1 –B2–B3 : Sheep

Fig-2: Olive fruit diameter of chicken (A, A2 & A3) and Sheep (B1, B2 & B3) manures treated olive tree

C1

C2

C1 – C2 - C3: Camel

C3

D1

D2

D1 – D2 - D3: CONTROL

D3

Fig-3: Olive fruit diameter of Camel manure treated olive tree (C1, C2& C3) and control (D1, D2 & D3)

It's more useful to decompose manure as organic matter in speed process. Camel manure decomposes faster than many others because of the diverse and stronger microflora in camels' rumen. [23] Decomposition rate of organic fertilizers effect on yield of nitrogen availability in the soil. Camel is, therefore, more efficient in nutrient recycling, making camels manures more useful for cropping and farming. In addition camel manure has almost the same value as that of cow manure. [24] Camel manure has valuable contents of nitrogen and other minerals comparing with sheep and chicken manures, that is may be due to camel feeding, and the storage method. Also may be camel manure has high ability to decrease harmful organisms for olive tree comparing with chicken and sheep manures.

CONCLUSION

In conclusion, organic manures have considerable nutritional requirements to olive tree used in improving of olive tree growth fruit properties and oil percentages. However, camel manure is the best one of the choices to increase properties of olive trees. To complete this research study, comparison among different camels manures necessarily required to study their nutrients variations and stability and effect on olive trees growth and their production.

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