



STUDY THE EFFECT OF RESIDUES (PALM, PEANUT, TEA) IN THE CHARACTERISTICS OF VEGETATIVE GROWTH AND YIELD OF ONION PLANT (*Allium cepa* L.)

Djilani Ghemam Amara^{1,2}, Saoud Djihad¹, Chelalga Nadjah¹, Kherraz Khaled^{1,2}, Chemsah Ahmed Elkhalifa, Zaid Alia, Mesbahi Mohammed Adel², Rebiai Abdelkrim² and Mohammad Mourad Senoussi³

¹Department of Biology, University of El Oued, El Oued, Algérie

²Laboratory of VTRS, University of El Oued, El Oued, Algérie

³Department of Biology, Laboratory of Biomolecules and Plant Amelioration, Larbi Ben Mhidi University, Oum El Bouaghi, Algeria

E-Mail: djilani-ghemamamara@univ-eloued.dz

ABSTRACT

The effect of residues was studied (palm, peanut, tea) in the characteristics of vegetative growth and the bulb onion in addition to the total yield of onion plant (*Allium cepa* L.) in El Oued zone (Algeria) during in 2016 season. An investigation was a randomized complete block design in three replications. The obtained results of experiment showed that: response the onion plant Application of fertilize by cooked tea leaves, were significantly better in of the studied characters (plants height and Leaves Area) with rate increased to 47.15% and 93.4% respectively, than control treatment. Followed by T1 and then T3. Peanut Peels treatment gave the largest number of tubular blades in the plant (12.33), the diameter of the bulb neck (13.48mm) and bulb Length (7.35cm) than other treatments. Followed by T2 and then T3. Cooked tea leaves plants gave highest diameter of bulb (5.42cm), highest bulb weight (66g) and yield (20.85 t/ha) in the season. Where Achieving with T1 (18.35t/ha) significantly increase in the yield total in comparison with other treatments.

Keywords: palm residues, onion, peanut peels, tea, vegetative growth and yield.

INTRODUCTION

The expansion large of agriculture in Algeria, especially in the southern regions, which are rich in water stocks (Ghemam A., 2007), has increased the accumulation of waste of cultivated crops, which cause environmental problems. The Wilaya of El Oued is one of the areas that experienced a quantum leap in the agricultural field.

The Souf region is one of the most important areas of the greens production (tomatoes and potatoes), addition to peanuts, where is the production respectively in the year 2015 to (1023, 10890, 158.6) Thousand quintals, as well as this region's popularity in the date palm cultivation and the production of dates from the old time. In the year 2015, the palms number is 3619400 Palme and the production of dates is about 2474 thousand quintaux (DPSB, 2015). Also, this region is famous for its large consumption tea.

Agricultural activity deposit great quantity of remnants, in the most time this remnant incinerated, causing environmental contamination. Organic agriculture aims to increase the crop production with developing the physico-chemical soil characteristics using organic residues as a fertilizer. The fertilizers differ in the decomposition speed, the chemical composition and availability of plant nutrients (NOSB, 1995).

Onion is one of important horticulture crops in the worlds, however in Algeria, in the economic, foods and medical area (ARAB., 2015). (Shrestha, 2007). The Onion bulb contains high nutriment and medical composition proportions (antioxidants) such as quercetin. (Patil *et al.*, 1995).

Using the organic fertilizers (animal and plant remnants) is not harmful to humans and the environment,

environments protection is one of the most important researches filed. In this context, this study aims to studding the remnants effect on growth and yield onion plant (*Allium cépa* L.).

Area study

The experiment was conducted out in Robbah in El Oued city (33°16'47" N, 6°54'35" E, 87m altitude) during 2016 spring season under drip irrigation (geonames, 2017). The mean maximum and minimum temperatures are 40°C and 5°C, respectively. The mean relative humidity is 29%, the mean of annual rainfall is 55.8 mm with mild desert climate (DPAT, 2015) (Voisin, 2004).

Design experiment

The experiment consisted of four treatments of manure (T0:control, T1: Palm waste, T2: Peanut Peels, T3:Post-cooked tea leaves) with three replications using 40 ton/ha in each farm. The experiment was carried out on a Randomized Complete Bloke Design (RCBD), at a spacing of 50 cm between blocks and treatments, respectively. Homogeneous seedlings with 12 - 15 cm high and four leaves that have been produced from cultivation of seeds were planted. While the distance between seedlings was 15 cm.

Planting and agronomic procedures

After 25 days of planting, fertilizers from plant residues were applied. Also, the same recommended agricultural operations have been done for all treatments.



Measurements

Observations were taken from 4 randomly selected plants from each sub-treatment to measure vegetative traits on growing periods and yield traits for the plants of Onion (*Allium cepa* L.) on local var. the following: (the leaves area, the plants height, the stems number, mean bulb weight, the yield, diameter bulb and bulb length). The analysis of variations ANOVA was made to determine the signification between the averages; it was compared by the use of LSD with 0.05 probability level.

RESULTS

The plants height

Generally, the plant growth is expressed by leaves and stems characteristics. Results indicate the onion plants length is depended by the type of fertilizer used (Table-1). plant height has significant difference in both Peanut Peels and Post-cooked tea leaves compared with the control during the first phase (40 days after transplantation). Also, the results showed increase significantly for the Post-cooked tea leaves compared with the Palm waste treatment. While, in the second phase (80 days after transplantation) has showed a significant difference for all treatments compared with the control. The Post-cooked tea leaves treatment gave a highest length (43.17 cm) then followed by the peanut peel (42.17 cm) then the Palm waste treatment (30.53 cm).

Table-1. Effect organic manure on the plants height in onion plant (*Allium cepa* L).

Treatments	Periods	
	After 40 days	After 80 days
T0	27.59c	29.33b
T1	35.25ab	42.17a
T2	41.07a	43.17a
T3	30.43bc	40.33a
LSD	7.53	3.83

The leaves area

The field experiment results (Table-2) of different manure treatments by Farm waste showed a difference in the leaf area and its rate growth during the two measurements 40 and 80 after planting seedlings process. The treatments T1 and T2 showed significant variation in the area leaf when compared to respective control

treatment, in the two measurements 40 and 80 after planting seedlings process. There was also no significant difference compared T3 treatment.

Otherwise the results showed an increase in the percentage of leaf area during the period between the two measurements, Where the treatment T3 showed significant variation in the rate of increase in leaf area compared to other treatments, the increase was up to 46.36 % which was very high compared to control treatment (17.96%), the area leaves increased by 19.43 % and 27.93% in treatments T1 and T2 respectively. This finding is in accordance with observation Alam *et al.*, (2007) that the vermicompost and chemical fertilizers has increased vegetative characteristics of the potato plant. Ghemam a et senossi. (2013) have reported that manure organic casts increases the rate growth. As well as the results of both sun *et al* (2009) and Gebory et klhafagy (2011).

Table-2. Effect organic manure on the leaf area and rate growth in onion plant (*Allium cepa* L).

Treatments	Periods		
	After 40 days	After 80 days	Increase%
T0	23.51b	28.44b	17.96
T1	47.32a	50.56a	19.43
T2	46.6a	55a	27.93
T3	29.70b	49.78a	46.36
LSD	11.42	14.36	-

The number tubular blades / plant

The results Table-3 of showed a difference in the number tubular blades and its rate increase in onion plant by different types of plant waste. The number of tubular blades increased in all treatments manures which was significant compared to respective control (T0). Treatment 1 showed the highest number of tubular blades after 20 days increased up 44.4%, followed by T3(40.74%) then T2 (39.94).

After 60 days, the treatment T2 showed significant variation in the number of tubular blades compared to respective other all treatments, the number of tubular blades of the onion increased up to 12.33 blade/plant increased by 85.14 %. the increase was up to 51.26 % , 61.75% in T2 and T3 Respectively, which was lower as compared to control treatment (T0) Despite the small number of tubular blades.

**Table-3.** Effect organic manure on the number tubular blades and its rate increase in onion plant (*Allium cepa* L.).

Treatments	Periods			
	After 20 days	Increase%	After 60 days	Increase%
T0	5.58 b	28.32	9.33 b	67.20
T1	6.66 ab	39.94	12.33 a	85.14
T2	7.16 a	44.13	10.83 b	51.26
T3	6.75 ab	40.74	10.92 b	61.78
LSD	1.31		1.72	

The diameter of bulb neck

The results shown in (Table-4) revealed that the exploitation of the various plant waste resulted in variation in the diameter of bulb neck in the onion plant. The treatments fertilizes showed 20 days after planting seedlings process no significant variation in increase the diameter of bulb neck when compared to respective control treatment, Where the largest diameter of the bulb neck was recorded in T2 (6.26 mm), then it is followed by both the peel peanut treatment at 5.39 mm then the Palm waste treatment at 5.37 mm.

The Results after 60 days of planting seedlings indicate a significant increase in the diameter of the bulb neck at T1 and T2 as compared with the control. Where the largest diameter of the bulb neck was recorded in T1 (13.48mm), also the results showed difference in the rate of increase diameter of the bulb neck between fertilize treatments and control treatment. Where the highest increase observed was for diameter neck of the bulb in T1, (150.1%) then it is followed by both the Palm waste treatment at (111.55%) then the peel peanut treatment at (90.89%).

Table-4. Effect organic manure on diameter of bulb neck (mm) in onion plant (*Allium cepa* L.)

Treatments	Periods		
	After 20 days	After 60 days	Increase%
T0	5.04 a	8.58 b	70.24
T1	5.39 a	13.48 a	150.09
T2	6.26 a	11.95 a	90.89
T3	5.37 a	11.36 ab	111.55
LSD	2.84	2.86	-

Characteristic yield of the onion plant

Shows The experimental results Table-5 of characteristic yield of the onion plant, after fertilization by different types of agricultural waste, significant increase in T1 and T2 for all characteristic (bulb diameter, bulb Length, rate bulb weight, total yield) compared to treatment no fertilizer (control T0) with no significant increased for T2 in bulb Length, and T1 in rate bulb weight, also the results showed significant increase in T1 and T2 for bulb diameter and total yield compared to respective the Palm waste treatment (T3), also the results showed significant increase in T2 for rate bulb weight compared to respective the Palm waste treatment (T3).

Where the percentage of rate bulb weight in the fertilization treatments on the control treatment is estimated to be (156.36%, 175.28%, 123.86%) respectively T1, T2, T3. The total yield ratios were in the same order (169.66%, 192.77%, 124.84%). Similar result was found also by Yoldas *et al.* (2011) they found the best result from organic manure. Farm waste activate system root and living organisms which stimulate the plant growth and absorption of nutrients (Arisha *et al.*, 2003; ouda et mahedeen, 2008), thus increases the height onion yield. Similar result was also reported by Jayatilake *et al.* (2003). They reported increase of organic manure application the bulb diameter increased each of Sankar *et al.* (2009), Mandal *et al.* (2013) and Brinjh *et al.* (2014).

Farm waste, which are as sources of many essential macro and micronutrients to plants, lower leaching of increase the uptake of nitrogen, phosphorus and potassium (Donald *et al.*, 2001) This increase has a positive effect on the photosynthetic rates, metabolic processes of organic compounds in plant, cell elongation and division (Fatideh and Asil, 2012; Soleymani and Shahrajabian, 2012). Thus, increased the height of the bulb onion bulb yield. Find the best treatment of tea leaves.

**Table-5.** Effect organic manure on bulb characterizes and yields in plant onion (*Allium cepa* L.)

Treatments	Bulb diameter	Bulb Length	Rate bulb weight	Total yield
T0	4.43 c	5.81 b	37.65 c	108.16 b
T1	5.33 ab	7.35 a	58.87 ab	183.5 a
T2	5.42 a	6.68 ab	66 a	208.5 a
T3	4.84 bc	6.54 ab	46.64 bc	135 b
LSD	0.52	1.22	12.73	27.30

CONCLUSIONS

This study concludes that the addition fertilizer plant residues improved qualities of growth and production plant onions, and cooked tea leaves were the best on the leaves area, the plants height, bulb diameter, rate bulb weight and total yield. The best the diameter of bulb neck and bulb Length were in Peanut Peels treatment.

REFERENCES

- Alam M. N., Jahan M. S., Ali, M. K., Ashraf M. A. and Islam M. K. 2007. Effect of vermicomposting and chemical fertilizers on growth, yield and yield components of potato in Barind soils of Bangladesh. *J. Appl. Sci. Res.* 3: 1879-1888.
- Al-Gebory K. D. H. and Al-Khafagy A. M. H. 2011. Effects of Some Organic Fertilizers on Growth, Productivity and Leaf Content from N, P, K Elements of Onion Plant. *K. J. agric. Sci.* 3(1): 47-55.
- ARAB. 2015. Agricultural Statistics Year Book. Vol. No. (35).
- Arisha H.M.E., Gad, A.A., Younes S.E. 2003. Response of some pepper cultivars to organic and mineral nitrogen fertilizer under sandy soil conditions. *Zagazig Journal of Agricultural Research.* 30: 1875-1899.
- Brinjh S., Kumar S., Kumar D. and Kumar M. 2014. Effect of integrated nutrient management on growth, yield and quality in onion, cv. PusaMadhavi, *Plant Archives.* 14(1): 557-559.
- Direction de la Programmation et du Suivi Budgétaires (DPSB). 2015. Monographie de la wilaya d'El-Oued 2014.
- Donald D. H., Essington E., Joanne L., Roland K. and Wyveta M. 2001. Phosphorus and Potassium Fertilization of Disk-Till and No-Till Cotto, the *Journal of Cotton Science.* 5(3): 144-155.
- Fatideh M. M. and Asil M. H. 2012. Onion yield, quality and storability as affected with different soil moisture and nitrogen regimes. *South-Western J. of Horti. Biology and Environment.* 3(2): 145-165.
- Geonames. 2017. www. Geonames.org.
- Ghemam A. D., and Senoussi, M.M. 2013. Influence of organic manure on the vegetable growth and tuber production of potato (*Solanum Tuberosum*. L Varspunta) in a sahara desert region. *Inte. J. Agri. Crop Sci.* 5(22): 2724-2731.
- Mandal J., Ghosh C. and Chattopadhyay G.N. 2013. Proportional Substitution of Chemical Fertilizers with Vermicompost on Growth and Production Potential of Onion (*Allium cepa* L.) *Int. J. Bio-res. and Str. Man.* 4(2): 356-357.
- National Organic Standards Board (NOSB). 1995. Definition of organic. Drafted and passed at April 1995 meeting in Orlando, Florida.
- Ouda B.A., Mahadeen A.Y. 2008. Effect of fertilizers on growth, yield, yield components, quality and certain nutrient contents in broccoli (*Brassica oleracea*). *International Journal of Agriculture and Biology.* 10(6): 627-632.
- Patil B. S., Pike L. M. and Yoo K. S. 1995. Variation in the quercetin content in different colored onions (*Allium cepa* L.). *J. Amer. Soc. Hort. Science.* 120(6): 909-913.
- Sankar V., Veeraragavathatham D. and Kannan M. 2009. Studies on organic farming in onion (*Allium cepa* L.) for the production of export quality bulbs. *The Asian Journal of Horticulture.* 4(1): 65-69.
- Shrestha H. 2007. A Plant monograph of Onion (*Allium cepa*). The School of Pharmaceutical and Biomedical Sciences Pokhara University, Simalchaur, Pokhara, Roll No. 11/2004.
- Soleymani, A. and Shahrajabian, M. H. 2012. Effects of different levels of nitrogen on yield and nitrate content of four spring onion genotypes. *Inter. J. of Agric. Crop Sci.* 4(4): 179-182.
- Sun Y.P., Zhang Z.P. and Wang L.J. 2009. Promotion of 5- aminolevulinic acid treatment on leaf synthesis is related with increase of antioxidant enzymes activity in watermelon seedlings grown under shad condition. *Ph. Synth.* 47(3): 347-354.



VOISIN A.R. 2004. Le Souf monographie. Ed. EL-WALID. p. 319.

Yoldas F., Ceylan S., Mordogan N. and Esetlili B.C. 2011. Effect of organic and inorganic fertilizers on yield and mineral content of onion (*Allium cepa* L.). Afr. J. Biotec. 10(55): 11488-11492.