American Journal of Life Science Researches
2021; 9(1): 32-37
Published online March-April, 2021 (http://www.diili.org/ojs-2.4.6/index.php/ajlsr/index)
ISSN: 2375-7485 (Print); ISSN: 2332-0206 (Online)

Original Paper

Effect of Mineral and Biofertilizers on Nutritional Values of Acacia saligna Seedlings

Abduraof Mustafa Omar Alosif*
Forest and Range Department, Faculty of Agriculture, Tripoli University, Tripoli-Libya

* *Corresponding author: Abduraof Mustafa Omar Alosif, Forest & Range Department, Faculty of Agriculture, Tripoli University, Tripoli, Libya. E-mail:* abd0_a15nor@yahoo.com

ARTICLE INFO
Article history:
Received 22 June. 2021
Revised 18 August. 2021
Accepted 17 September. 2021

The present study was conducted to figure out the effect of some mineral and biofertilizers on nutritional value of Acacia saligna seedlings. This study was carried for 14 months at the nursery of Forestry and Wood Technology Department, Faculty of Agriculture, Alexandria University-Egypt. Three commercial mineral fertilizers were used in this study: Urea, Calcium superphosphate, and Potassium sulphate as a source of nitrogen, phosphorus, and potassium (NPK). In this study, six levels of mineral fertilization treatments were used [F0-F5]. The results of this study showed that Acacia saligna seedlings treated with F2 & F3 fertilizers recorded the highest value of crude protein, whereas, treatment with F2 fertilizer showed the highest value of crude fat. In addition to that, the lowest content of crude fat was found in the seedlings of Acacia saligna treated with F5 (halex biofertilizer). Seedlings treated with F4 fertilizer showed no significant difference in content of crude protein from that treated with F5 fertilizer. i.e., the crude protein and crude fat were found to respond to mineral fertilizers, whereas, crude fiber and total ash are not effected by adding fertilizers.

Keywords: Mineral, Biofertilizers, Nutritional Values, Acacia saligna Seedlings

INTRODUCTION
INTRODUCTION

The present study concerns mainly with the effect of mineral and biofertilizers on the nutritional value of *Acacia saligna* seedlings. Such species is well adapted to barren slopes, derelict land, and arid conditions. *Acacia saligna* is used for stabilizing drift sands and wood production, whereas, its leaves and pods are used as supplementary feed for sheep and goats [13]. Application of mineral fertilizers more especially NPK increase the absorption of nutritions by roots, which in turn led to increase the growth of the species under investigation. In addition to that, application of biofertilizer showed an increase in Nitrogen content in the plant organs. Baumi (2010) indicated that biofertilizers increased the productivity and the content of both crude protein and crude fibers

for *Acacia saligna*, and found that the highest significant crude fiber was in fall (21-90%) compared to spring (17-70%). Abdultazak et al. (2000) reported that crude protein of *Acacia* foliage is high enough to use as supplement to low quality diets. Alosif (2020) recorded the highest shoot height, leaf number, leaf dry weight, and highest value of shoot/root ratio of *Acacia saligna* were obtained when seedlings treated with mineral fertilizers, and no effect on growth when seedlings treated with halex biofertilizer. Almodares et al. (2009) revealed that application of Nitrogen fertilizers increased the amount of forage protein and decreased the fiber content. In 2000 (El-Shaer) determined the chemical composition of *Acacia saligna*, and showed that the value of protein (12.5%) is reasonable and enough to cover the maintenance requirements of protein for ruminants. Several authors have published number of publications concerning the effect of mineral and biofertilizers on the nutritional value of *Acacia saligna* seedlings and other plants [5-9,12 & 14- 15].

Materials and Methods

Seeds of *Acacia saligna* were collected from healthy trees at the nursery of Forestry and Wood Technology Department, Faculty of Agriculture, Alexandria University-Egypt. The soil used in this study was obtained from Department nursery in Abies region, Alexandria, and it was a mixture of clay and sand [1:2, V: V]. Three commercial mineral fertilizers were used: Urea [46% N], Calcium superphosphate [15% P_2O_5], and Potassium sulphate [48% K_2O] as a source of nitrogen, phosphorus, and potassium respectively. In addition to that, halex biofertilizer was also used.
Samples of leaves and stems were grounded in Wiley mill into powder; part of each sample was analyzed for dry weight crude protein, crude fat, and total ash as described by Association Official Analytical Chemists (A.O.A.C.) in 1990.
Seedlings were fertilized with the 1st dose after 4 months [1st of July 2013], and the 2nd dose after two months later [1st of September 2013], when seedlings aged 6 months. Six levels of fertilizers were used in this study: **F_0** [control]. **F_1** [1g N, o.5 P_2O_5, and 0.5g K_2O/Kg soil]. **F_2** [0.5g N, 0.25g P_2O_5, and 0.25g K_2O/Kg soil], **F_3** [1g N, 0.5g P_2O_5, 0.5g K_2O], and [0.5g halex/Kg soil]. **F_4** [0.5g N, 0.25g P_2O_5, 0.25g K_2O, and 0.25 halex/Kg soil], and **F_5** [1g halex/Kg soil]. The nutritive values investigated in this study included crude protein, crude fat, crude fiber, and total ash. The determination of sulphuric acid consumed gives the content of crude protein in g/kg as described by (A.O. A. C). The crud fat determination was done by using soxhlet fat extraction as described by (A.O. A. C). The crude fiber (CF) content [g1kg dm (dry matter)] is given by the ratio of the equation {CF= (a-b/w) *1000}, where a= loss of weight after ashing, b= loss of weight (g) after ashing during blank test, and w= sample weight (g dm). The total ash content (g/kg dm) is determined by the equation {TA= (a-b/w) *1000}, where a= mass (g) of crucible after ashing, b= mass (g) of dry tared crucible, and w= mass (g) of dry sample.

RESULTS

The effect of mineral fertilizers on the nutritional value of *Acacia saligna* seedlings was studied and the results had shown the followings [Table 1]. Seedlings treated with F_2 fertilizer displayed the highest crude protein content (20.89%) followed by F_3 fertilizers (19.13%), whereas, those

treated with F_4 (18.38%) & F_5 (18.13%) reveled less crude protein content. Moreover, statistical analysis variance had shown no significant differences between seedlings treated with halex & NPK (F_4) and those treated with only halex (F_5) in crude protein content. However, seedlings treated with F_4 & F_5 fertilizers increased crude protein content compared with those treated with F_0 (control) which displayed the lowest crude protein content (16.472%). In addition to that, statistical analysis showed that there is no significant effect of any treatments on crude fiber content in *Acacia saligna* seedlings. However, the mean average of crude fiber in the seedlings of *Acacia saligna* was 14.147%. As for crude fat the results showed that seedlings treated with F_2 fertilizer displayed the highest crude fat content (2.25%), whereas, those treated with F_1 & F_3-F_5 fertilizers have no significant differences between them with an average of 2.120%, 2.110%, 2.102%, and 2.134% respectively, however, the lowest content of crude fat (1.974%) was obtained in seedlings treated with F_0 (control). As it is appeared in (Table 1), fertilization treatments with F_1-F_5 had no significant impact on the total ash content in seedlings of *Acacia saligna*, and regardless of fertilization, the mean average of total ash content is 12.035%.

Table 1: Means of crude protein, crude fiber, crude fat, and total ash of leaves of unfertilized and 14 months fertilized *Acacia saligna* seedlings.

Treatments	Mean			
	Crude Protein (%)	**Crude Fiber (%)**	**Crude Fat (%)**	**Total Ash (%)**
F_0 [control]	16.4720^{D}	14.1220^{A}	1.97400^{C}	12.1520^{A}
F_1	18.3500^{C}	14.3820^{A}	2.12000^{B}	11.7080^{A}
F_2	20.8900^{A}	15.1080^{A}	2.25000^{A}	11.5860^{A}
F_3	19.1340^{B}	13.9380^{A}	2.11000^{B}	12.4100^{A}
F_4	18.3860^{C}	13.7320^{A}	2.10200^{B}	12.1100^{A}
F_5	18.1300^{C}	13.6000^{A}	2.1340B	12.2440^{A}
Mean	18. 5603	14.14700	2.115000	12.03500
L.S.D	0.7461	2.0576	0.0951	0.9566
C.V	3.047202	11.02434	3.407100	0.025166

Within each column, Values with the same superscript are not significant at 0.05, 0.01 level probability.

DISCUSSION

This study concerned mainly with the effect of mineral and biofertilizers on nutritional value of *Acacia saligna* seedlings. Application of biofertilizer to the seedlings of *Acacia saligna* showed an increase in nitrogen content, the productivity, and the content of both crude protein and crude fiber. In addition to that, seedlings treated with F_2 & F_3 fertilizers showed an increase in crude protein [20.89% & 19.13%] respectively. Whereas, those treated with F_4 & F_5 fertilizers revealed less crude protein content, i.e., no significant differences had been noticed in treatments with F_4 (18.38%) or F_5 (18.13%) in terms of crude protein content. However, seedlings treated with F_0 (unfertilized) displayed the lowest crude protein content (16.472%). Statistical analysis showed that there is no significant effect of any treatments on crude fiber content in seedlings of *Acacia saligna*, and the mean average of crude fiber recorded was 14.147%. Moreover, seedlings treated with F_2 fertilizer revealed the highest crude fat content (2.25%), whereas, those treated with F_1 & F_3-F_5 fertilizers showed no significant difference between them (Table 1). On the other hand, seedlings of *Acacia saligna* treated with F_1-F_5 fertilizers showed no significant effect on the total ash content, and regardless of fertilization, the mean average of total ash content is 12.035%. In general, the seedlings of *Acacia saligna* were sensitive to fertilizers in terms of crude protein and crude fat only; however, the content of crude fiber and total ash was not affected by additions of any fertilizers. Biofertilizer F_5 recorded to increase the content of crude protein, but has no effect on the content of crude fat.

Based on the results in (Table 1) it is recommended to add mineral fertilizers particularly F_2 fertilizer to increase dry weight and nutritional value mainly crude protein & crude fat of Acacia *saligna* shrub. Fertilization in general makes plants juicer and less fibrous especially at seedling and sapling stages.

REFERENCES

1. Abdulrazak, S.A; Fujihara, T; Ondiek, J.K. and Orskov, E.R. 2000. Nutritive Evaluation of some tree leaves from Kenya. Animal Feed Science and Technology 85, 89-98.

2. Almodares Abas et al. (2009). The Effect of Nitrogen Fertilization on Chemical Composition in Corn and Sweet Sorghum. Department of Biology American-Eurasian J. Agric & Environ. Sci;6(4): 441-446

3. Alosif, A.M.O, 2020. Effect of Mineral and Biofertlization on Growth of *Acacia saligna* Seedlings. J. of Advanced Botany and Zoology, V.714.o1.Do1: 10.5281/Zenodo. 3782502

4. A.O.A.C; (1990). Official Meethods of Analysis. 15th Ed. Association of Official Analytical Chemists. Washington D.C.

5. Baumi, N.H. 2010. Effect of some agricultural practices of *Acacia saligna* under el-Negaila region conditions. Annals of Agric. Sci; Moshtohor. Vol.48 (3) pp.1-18.

6. Ceccon, N.; Huante and Campo, J. 2003. Effect of nitrogen and phosphorus fertilizers on the survival and recruitment of sdlings of dominant tree species in two abandoned tropical dry forestin Yucatan, Mexico. Forest Ecol. and Manag, 182:387-402.

7. Cicek, E.; Yilmaz F, and Yilmaz M. 2010. Effect of N and NPK fertilizers on early field performance of narrow-leaved ash, *Fraxinus angustifoli*. J. of Environment Biology, 31: 109-114.

8. Cromer, JR. N.1989. Response of Australian tree species to Nitrogen and Phosphorus In Thailand, ACIAR Monograph. 10: 139-143.

9. Crouch, G. and Radwan, M. A. 1981. Effect of Nitrogen and Phosphorus fertilizers on Deer Browsing and Growth of Young Douglas- Fir. United States Department of Agriculture, Research Note PNW-368.

10. Crous, J. W. Morris, A. R. and Schole, M. C. 2009. Effect of Phosphorus and Potassium fertilizer on stem form, basic wood density and stem nutrient content of pinus patula at various stem heights. Australian Forestry. 72 (2): 99-111.

11. Degen, A. A. et al. 1997. The nutritive value of *Acacia saligna* and *Acacia* for goats and sheep. Animal Science 64: 253-259.

12. El- Shaer H. 2000. Utilization of *Acacia saligna* as livestock fodder in arid and Semi-arid areas in Egypt. Sulas L. (ed.) Legumes for Mediterranean for age crops, pastures and alternative uses. Zaragoza CIHEAM.2000: 213-217.

13. Krebs, G. L. et al. 2007. The effect of feeding *Acacia saligna* on feed intake, Nitrogen balance and rumn metabolism in sheep. Asian-Aust. J. Anim. Sci. vol. 20,

9: 1367-1373.

14. Nakos, G. 1980. Fertilization and nutrient experiment with conifer seedlings in pots.

    Plant and Soil, 55 (2): 269-281.

15. Otuba, M. 2012. Effects of soil Substrate and nitrogen fertilizer on biomass production of Acacia saligna and Acacia sieberiana in Eastern Uganda.M.Sc. Thesis, Forest as a Natural Resource - Master's program. Department of Crop Production, Ecology Uppsala.

16. Salem, A. Z.2005. Impact of season of harvest on in vitro gas production and dry matter degradability of Acacia saligna leaves with inoculums from three ruminant species. Animal Feed Science and Technology, 123-124.