EFFECT OF PLANTING DISTANCE AND MINERAL FERTILIZATION ON GROWTH, YIELD AND ACTIVEINGREDIENTS OF

MORINGA PLANT

By

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B.Sc. Agric.Sc. (Horticulture), Ain Shams Univ. 2009

M. Sc. Agric. Sci. Ain Shams University 2013

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ABSTRACT

Ahmed Nazmy Abdel-hamid. Effect of Planting Distance And Mineral Fertilization on Growth, Yield And Active Ingredients Of Moringa Plant. Unpublished Doctor of Philosophy dissertation, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2015.

This study was carried out during the two successive seasons of 2013 and 2014 in a private farm at Wadi El- Natron region, Behira Governorate . This study was to evaluate the effect of planting distance and mineral fertilization on growth , yield and some chemical constituents of ***Moringa oleifera*** and ***Moringa stenopetala*** plants. The experiment trials included three planting distances (20X 60 cm & 40X 60cm and 60X60 cm) and three levels of absolute amount of NPK (N_{100} P_{100} K_{50} , N_{200} P_{200} K_{100} and N_{300} P_{300} K_{150}) and their combination .

For ***Moringa oleifera*** plant data showed that highest plant heights were obtained with high planting distance (60X 60 cm) and high levels of NPK (300: 300 : 150) units . On contrary, narrow distance (20X 60 cm) and high NPK levels produced highest values of branches / plants .However, the highest number of leaves per plants was recorded by low planting distance and high NPK fertilization level .Highest values of stem diameter were obtained with high planting distance 60X 60 cm and high NPK fertilization 300- 300- 150 . Regarding fresh weight (g/ plant) the highest values were obtained through high planting distance 60X 60 cm and high level of NPK fertilization 300- 300-150 . On contrary , the highest values of dry weight (g/plant) were recorded by high planting distance without significant effect due to NPK fertilization levels. Total fresh yield per plant (g/ plant) was maximized with medium planting distance 40X 60 cm and high level of NPK fertilization . However total dry yield per plant (g/ plant) were recorded by low

planting distance 20X 60 cm without significant effect to the three levels of NPK either on total dry yield or on estimated fresh or dry weight (ton/fed) of ***Moringa oleifera*** .

The maximum levels of N , P , K , Ca , Mg , Fe , Zn and Mn elements in ***Moringa oleifera*** levels were recorded in most cases with high planting distances (60X 60 cm) . However , no significant effect to plant distances on P content was obtained . On the other hand ,the maximum levels of N, K , Ca , Fe and Zn elements were recoded by the high NPK fertilization level , whereas no significant effect to NPK fertilization level on P, Mg and Mn contents were recorded

Regarding active ingredients in *Moringa oleifera* herbs in this study including total chlorophyll , total carotene , total flavonoides , total tannins , and L- ascorbic acid . Average values of these compounds ranged from 13.8 – 15.6 mg/ 100 g fresh weight for total chlorophyll , from 15.2- 20.8 mg/ 100 g fresh weight for total carotine, 2.09- 2.80 mg/g fresh weight for total flvonoides ,from 6.18 – 8.77 mg/ dry weight for total tannins and 300- 380 mg/ 100 g fresh weight for L- ascorbic acid High planting distance recorded the highest values of, total carotene, total flavonoides, and L- ascorbic acid , whereas high. total chlorophyll was obtained with low planting distance without significant effect to NPK fertilization level on total tannins. On the other hand . no significant effect from NPK on total chlorophyll , total flvonoides and total tannins, whereas low NPK fertilization level recorded the high values of total carotine, high NPK level recorded the high values of L- ascorbic acid

For ***Moringa stenopetala*** plant data showed that, highest planting distance 60X60 cm greatly increased some vegetative growth parameters of *M* . ***stenopetala*** such as plant high (cm) , number of leaves / plant , stem diameter (mm), fresh weight (g/plant) . However , no significant effect from planting distance on number of branches / plant or dry weight (g/ plants) were recoded . On the other hand , no significant effect of NPK fertilization levels were detected on plant height number of branches / plant and dry weight (g/plant)

whereas high NPK levels significantly increased number of leaves / plant , stem diameter (mm) and fresh weight (g/plant)

The maximum levels of N , P , K, Ca , Fe and Zn elements in ***Moringa stenopetala*** leaves were recorded in most cases with high planting distance 60X 60 cm . However , no clear effect to planting distances on Mg and Mn content was obtained . The effect of NPK fertilization in most cases, whereas high NPK levels recorded the higher values of Fe and Zn elements .

Regarding the active ingredient in ***Moringa stenopetala*** under the conditions of this study ranged from 9.9 -10.7 mg/ 100 g fresh weight for total chlorophyll , from 12.6 – 14.9 mg/100g fresh weight for total carotene from 1.23 – 1.35 mg/g fresh weight for total flavonoides , from 3.96 – 5.20 mg/g dry weight for total tannins and from 232 – 250 mg/100g fresh weight for L- ascorbic acid.

High values of total chlorophyll , total flvonoides, total tannins , and L- ascorbic acid were obtained with high planting distances whereas low planting distance exhibited the highest values of total carotene . However, , no significant effect were found due to NPK fertilization levels , on total chlorophyll , total carotene , total flvonoides and total tannins .High NPK level recorded the highest values of L- ascorbic acid in ***Moringa stenopetala***

Key words: *Moringa oleifera*, *Moringa stenopetala* planting, distances, NPK mineral fertilization , vegetative growth , mineral contents , active ingredients

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