



Sudan University of Science & Technology

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**Aromorphological, Molecular & Quality Investigations on
Moringa oleifera & *Moringa peregrina* as affected by
water intervals**

By :

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DEDICATION

To the delight of my heart when I meet her, Kindergarten to love which grows purer flowers

Mom

To a symbol of manhood and sacrifice of pushed me into science, always proud of him

Dad

To those who are closer to the spiritual to the bosom of the mother, I derived my strength from their

Sisters & Brothers

To those who presented matter support in my studies, to those making the obstacles easier

, Memorial recognition

My friends

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ABSTRACT

This study was carried out to evaluate growth of two commonly known Moringa species in Sudan Moringa oleifera & Moringa peregrina under different watering intervals were subjected to three treatments 10, 20 and 30 days for two consecutive seasons (2011\12-2012\13) in the demonstration farm at Sudan University college of Agriculture(Shambat). Complete Randomized Block Design with four replicatio^o ns was used layout of the experiment. The seeds that used in the study were obtained from the seed Research Centre (Soba). Moringa oleifera demonstrated a fast germination and was established in 4 weeks, Moringa peregrina delayed in germination and had very slow growth, took 2 months. This result led to dropping Moringa peregrina from the field experiment part and continued with Moringa oleifera alone. However the chemical and molecular analyses continued and were done for both Moringa species.

Results showed that, there were no significant difference between all of the growth parameters plant height, number of leaves per plant, stem diameter, fresh weight, dry weight and root dry weight in two seasons

Results showed that, Moringa peregrina and Moringa oleifera leaves contain Protein, Fiber, Ash, Fat and Carbohydrate it analyzed by using AOAC and the dry aching methods. Moringa leaves can be considered as good fodders as it contain essential nutrients that can improve growth performance of animals the percentage of protein is higher in Moringa oleifera. Whereas, Moringa oleifera roots showed higher fiber content.

Mineral composition showed that, highly variation between leaves of the two Moringa species. Were detected Moringa oleifera gave higher percentage of Ca, K, Fe, and Mn. Whereas, Moringa- peregrina contained higher percentage | in Na and Mg. On the other hand, root analysis indicated that the Moringa

oleifera was slightly higher than the *Moringa peregrina* in contents of K. *Moringa peregrina* showed higher percentage in Na.

Inter-Simple Sequence Repeat (ISSR) technique was used, using twenty primers to investigate the genetic diversity between the two *Moringa* species, data of the primers that showed, high among 22 sample of the two *Moringa* species was detected polymorphism were statistically analyzed. The ISSR primers showed 45 polymorphic bands. The distance matrix values ranged between 1.41 to 5.48, which reflected high range of variation. The tree diagram (UPGMA) for the 21 variables of the two *Moringa* species showed clear clustering, as each species clustered separately, only one individual was different from all and appeared as out-group. ISSR technique was found very useful in revealing genetic variation between the two species..

مستخلص الاطروحة

اجريت الدراسة لتقييم نمو نوعين من انواع *Moringa* الاكثر شيوعا فى السودان *Moringa oleifera & peregrina*. تحت تاثير فترات ري مختلفه ١٠ ، ٢٠ ، و ٣٠ يوم لموسمين متتاليين (١٢/٢٠١١ / ١٢/٢٠١٢)، باستخدام تصميم القطاعات كاملة العشوائية في اربعة مكررات تم اجراء التجربه الحقلية بمزرعة التجريبية بجامعة السودان (شمبات). تم الحصول علي البذور التي استخدمت فى هذه الدراسة من مركز ابحاث البذور بسوبا .

اظهرت *Moringa oleifera* تفوق في فترة النمو والتأسيس اذ اخذت ٤ اسابيع بينما *Moringa peregrina* شهرين ادي الاختلاف في فترات النمو الي استبعاد *Moringa peregrina* من التجربة الحقلية ومواصلة صنف واحد فقط بينما تمت دراسة التحليل المعملّي الجزيئي والكيميائي للصنفين معاً .

اظهرت النتائج عدم وجود فرقات معنوية لصفات طول النبات، عدد الاوراق، قطر الساق، الوزن الرطب ، الوزن الجاف و وزن الجذور الجاف للموسمين.

اظهرت النتائج ان *Moringa oleifera & Moringa peregrina* تحتوى على بروتين ،الياف ، رماد ، دهون وكربوهيدرات تم التحليل باستخدام AOAC. تعتبر اوراق لمورينغا اعلاف جيدة لانها تحتوى على عناصر غذائية اساسية تحسن من صفاتها كعلف للحيوانات. اظهرت النتائج ان نسبة البروتين اعلى فى المورينغا اولفيرا بينما اظهرت جذور مورينغا اولفيرا نسبة اعلى فى محتوى الالياف.

اظهرت العناصر المعدنية وجود فروقات بي الاوراق للصنفين، اعطت *Moringa oleifera* نسب اعلى فى احتوائها الكالسيوم ، البوتاسيوم، الحديد، المنجنيز ، بينما اظهرت *Moringa peregrina* اعلى نسب فى احتوائها الصوديوم، المغنيسيوم . كما اظهرت النتائج التحليلية للجذور مؤشر بان *Moringa oleifera* اعلى قليلا فى احتوائها البوتاسيوم من. بينما اظهرت *Moringa peregrina* تفوقا فى احتواء الصوديوم.

استخدمت تقنية ISSR ٢٠ بادي لدراسة وتقييم التنوع الجيني بين صنفى المورينغا، اظهرت نتائج التحليل الاحصائي للبادئات التعرف علي ٤٥ حزمة متباينه وقد تراوح مدي الاختلافات الجينية بين 1.41 to 5.48 مما يعني وجود تنوع وراثي كبير . وقد اوضح الرسم الشجري العلاقة بين الطرز الوراثة الصنفين اوضحت تقارب واضح بين ال ٢١ نوع . عدا نوع من *Moringa*

oleifera واحد غير متقارب ، اوضحت النتائج ان استخدام تقنية ISSR مفيدة لدراسة التباين الوراثي بين الصنفين ، اثبتت الاختلافات بين الصنفين انه يمكن استخدام تقنية ISSR لدراسة *Moringa*.

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List of Abbreviations

DNA	Deoxy ribonucleotide acid
ISSR	Inter-Simple Sequence Repeat
RAPD	Randomly Amplified Polymorphic DNA
AFLP	Amplified Fragments Length Polymorphism
SSR	Simple Sequence Repeats
RFLP	Restriction Fragment Length Polymorphism
Taq	<i>Thermus aquaticus</i>
CTAB	Cetyl trimethyl Ammonium Bromide
UV	Ultra Violet
TBE	Tris-Borate EDETA
EDETA	Ethylene Diamine Tetra Acetic Acid
PCR	Polymerase Chain Reaction