

Acknowledgements

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Seeds physical and physiological characteristics and dormancy of four important indigenous and exotic tree species in Sudan

Abstract

This study focused on generating knowledge on the characteristics of the seeds of some important indigenous and exotic tree species of economic and environmental importance.

The studied seeds are namely *Diospyros mespiliformis* (goghan), *Oxytenanthera abyssinica* (gana), *Moringa oliefera* (Rawaq), and *Conocarpus erectus* (Damas Saudi).

The goal of this work was to study the phenomenon of dormancy in the seeds of the above mentioned species and to find the best method to break it. The aim is to provide the right information and the suitable techniques for foresters in charge of afforestation programs and for tree planters in general for the success of tree planting processes in the Sudan. A second objective was to know the effect of cool storage ($12\pm 1C^{\circ}$) on seeds characteristics e.g. longevity and to determine the suitable period for storing the seeds, so as to save the resources of the Tree Seed Center and to determine the amount of stock of quality seeds to meet the demand. Also to reduce the cost of annual collection of the seeds of the same species.

In this work the seed physical and physiological characteristics were explored through the determination of purity percentage, seed soundness, seed moisture content, number of seed /kilogram, seed viability and germination. Also the kind of dormancy found in the four species was identified and the longevity of *Diospyros mespiliformis* in the cool store was estimated.

Seeds of *D. mespiliformis*, *O. abyssinica*, and *M. oliefera* were found not to have any type of dormancy. *C. errectus* seeds identified as dormant.

The study suggests further studies to understand the causes of this dormancy and to find a suitable method to break it.

الخصائص الطبيعية والفسولوجية والكمون لبذور أربعة أنواع من الاشجار المحلية والمستجلبية المهمة في السودان ملخص البحث

اهتمت هذه الدراسة بمعرفة خصائص بذور أربعة من الأشجار المهمة في السودان ومعرفة العوامل البيئية والفسولوجية التي تؤثر على حيويتها و انباتها باعتبارها أشجار ذات أهمية اقتصادية وبيئية وتتمثل في بذور أشجار الجوغان والقنا والمورنقا والدمس السعودي.

هدفت الأطروحة الى دراسة ظاهرة الكمون في الأنواع أعلاه وايجاد أفضل المعالجات لازالتها بغرض الالمام بالتقنية الجيدة والمناسبة وتوفير المعلومة الصحيحة لادارات مشاريع التشجير وكل المهتمين بزراعة الأشجار من أجل انجاح برامج التشجير والاستزراع الغابي في السودان. كما اهتمت الدراسة بمعرفة أثر التخزين البارد ($12\pm 1C^{\circ}$) على خصائص البذور المتوفرة بمركز بذور الأشجار القومي بسوبا وغيره حتى يتم توزيعها توزيعا أمثل لمقابلة الطلب على البذور ذات الجودة العالية في الأوقات الحرجة وعدم اهدار هذا المورد الطبيعي ولتقليل تكلفة الجمع السنوي لنفس الأنواع.

من خلال هذه الدرلسة تم التعرف على الخصائص الطبيعية والفسولوجية للبذور قيد الدراسة من حيث النسبة المئوية للبذور النقية والرطوبة النسبية والبذور السليمة والتالفة وغير المكتملة أوغير الناضجة بالاضافة لعدد البذور في الكيلوجرام الواحد وحيوية البذرة كما تم الكشف عن معرفة نوع الكمون الموجود بكل نوع من البذور بالاضافة لمعرفة أثر التخزين على طول عمر البذرة المخزنة في ظروف مثالية متمثلة في بذرة الجوغان في التخزين البارد.

تم اجراء العديد من المعاملات بناء على نوع الكمون الموجود فى البذور قيد البحث لاختيار أفضل المعالجات لكسره.

كما تمت معرفة أو تقدير فترة التخزين لبذور الجوغان بناء على طول عمر البذرة حتى لا يهدر المال والوقت والجهد في حفظها لفترات ما بعد فقدان حيويتها.

خلصت الدراسة الى عدم وجود كمون في بذور كل من الجوغان والقنا والمورنقا. وجد أن بذور الدمس السعودي كامنة. اقترحت الدراسة اجراء

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Glossary of terms

Cotyledon (s): The primary leaf or leaves in the embryo

Endosperm: Triploid tissue which develops from the fusion of a sperm nucleus with two polar nuclei of the embryo sac. It supplies nutrients to the embryo and may be entirely used up during seed formation, or part of it may remain and sustain the seed during germination.

Germination: Ultimately the production of a seedling from a seed, the emergence of the radicle from the seed is normally the first visible sign that germination has commenced, but germination begins from the first metabolic process during imbibitions.

Embryo: The rudimentary plant within a seed, which arises from the zygote or sometimes from unfertilized egg cell. It consists of an axis bearing an apical meristem, a radicle and one or more cotyledons.

Endocarp: The inner layer of the pericarp.

Deciduous: A plant whose leaves are shed at specific season.

Dormancy: The condition of a live seed which prevents germination when it is supplied with the conditions normally considered to be suitable for germination.

Germination test: A laboratory test to estimate the proportion of seeds within an accession capable of germinating.

Hermetic storage: Storage in air-tight, moisture, proof container.

Long term storage: The storage of seed accession for long periods, (a decade or more).

Longevity: Life span. In seeds it is a length of time that they remain viable. The life span depends on the species and the environmental conditions under which the seeds are stored.

Open storage: Storage conditions where seeds are exposed directly or indirectly to ambient relative humidity and temperature.

Orthodox seeds: Mature whole seeds not only survive considerable desiccation to at least 5% moisture content but their longevity in air-dry storage is increased in predictable way by reduction in seed storage moisture content and temperature.

Viability: The possession in a seed of those processes essential for a seed to germinate. Thus a viable seed is a live seed, but this does not ensure that the seed will germinate.