IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 17, Issue 2 Ser. I (February 2023), PP 31-40
www.iosrjournals.org

Effect of seed pretreatments on the germination of four spontaneous species(*Acacia tortilis subsp. raddiana (Savi) Brenan, Bauhinia refuscens* Lamand *Sclerocarya birrea (A. Rich.) Hochst* and*Ziziphus mauritiana* Lam)in central eastern of Niger.

MOUNKAILA Soumaila[1*,] ADAMOU Karimou Ibrahim[2], ALI Ado[1], SALA Bara Halilou[3],BAGNA Issoufou [3]
[1]*University of AGADEZ, Faculty of Sciences and Technics, Department of Biology,Niger*
[2] *University of Tahoua, Faculty of Agronomic Sciences, Department of Animal Productions,Niger*
[3] *University of Tahoua, Faculty of Agronomic Sciences, Department of Natural Resources and Environment Management, Niger*
**Corresponding author: soummo2@yahoo.fr*

Abstract
This study concerns the germination test of four forest species (Sclerocarya birrea Lam, Bauhinia refuscens, Acacia tortilis, Ziziphus mauritiana) in central eastern Niger (Bermo). The main objective is to assess the effect of standard pretreatments on the germination of these forest species to select the best method of breaking dormancy for these plants. The pretreatments applied to each of the four species, in a common Latin square device, were the scalding of the seeds, soaking in cold water for 48 hours and 72 hours, and the control. The results show germination rates which varied according to the treatments, from 77 to 88% for Sclerocarya birrea*, from 64 to 67% for* Bauhinia refuscens*, from 52% to 90% for* Ziziphus mauritiana *and from 50 to 61% for Acacia tortilis. The analysis of variance did not show any significant differences between the treatments for these germination rates (p> 0.05). In addition, in the two species* Sclerocarya birrea *and* Acacia tortilis*, a significant difference was observed between the treatments for the time of germination, the speed of germination, and the duration of germination. The control has been better for the majority of the germination parameters studied, this study does not allow us to identify the best treatment for the break of dormancy.*
Keywords*: Forest species, Pre-treatments, Dormancy break, Niger*

Date of Submission: 02-02-2023 Date of Acceptance: 13-02-2023

I. Introduction

Tropical forests constitute an immense reservoir of biological resources; they play a fundamental role in meeting many of the needs of populations. (Ahoton*et al*, 2009). However, these spontaneous plants are under increasing pressure, due to the needs of populations for non-timber and timber forest products (food, pharmacopeia, firewood, timber, and services), bushfires, overgrazing, and changes. Climatic conditions lead to their destruction or even disappearance. Sahelian ecosystems are undergoing severe degradation due to climatic deterioration and strong anthropization. This situation is detrimental to the economy of the countries concerned, and thus to the living conditions of the populations. (Diouf *et al*., 2002).In Niger, spontaneous vegetation is the main source of food supplements for populations, especially in rural areas(Le Floc'h and Grouzis, 2003.However, the recurrence of droughts in recent decades, relating to rainfall deficits and floods, has led to a decline in food production based mainly on rainfed cultivation.Consequently, natural ecosystems are subject to abusive exploitation by an increasingly growing population and livestock (Ganaba, 1994).

The extreme desert conditions mean that the meager plant cover that remains and has developed adaptation strategies allowing it to make the most of the slightest climatic conditions favorable to its proliferation (Chehma, 2006).In higher plants, the seed ensures reproduction. It is most often an organ of resistance capable of waiting for a very long time in a practically inert state, the conditions which will allow it to enter into activity and give birth to a young plant: this passage from slowed down life to active life constitutes germination (Chaussat *et al*., 1975).

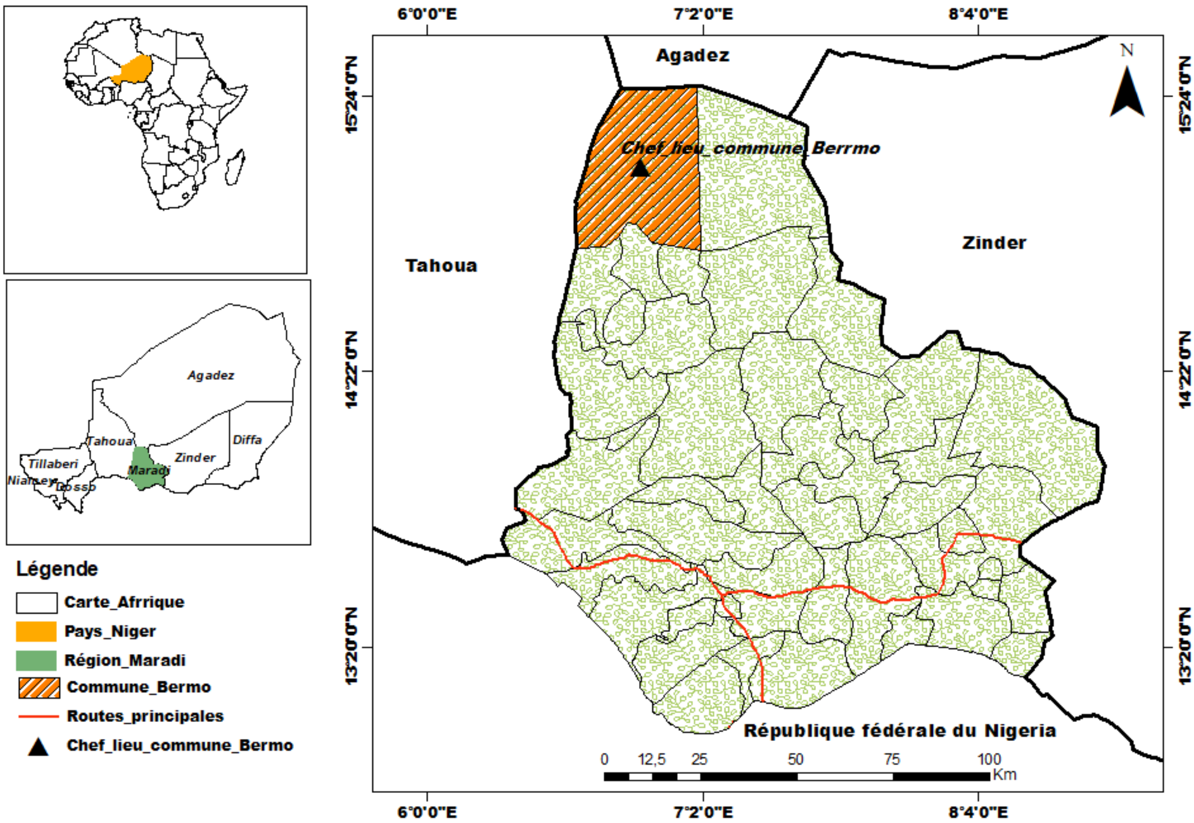
Managing the germination of local woody species is the keystone for the sustainable management of arid and semi-arid vegetation types in Niger, especially since recently local species have been used in reforestation programs. The country's plant formations contain many species with high economic potential, including *Sclerocarya birrea,Bauhiniarufescens, Acacia tortilis,* and *Ziziphus mauritiana*. These four forest species in this study provide many services to the population (Maydell, 1983; Arbonier, 2000) and can be used in reforestation programs. Given the importance of the germination phase of seeds in the development of later stages of the development of all plant species, particularly in arid zones, it is essential to study the germination behavior of these species. Also, for many tree species, a special pretreatment of the seeds is necessary to obtain satisfactory germination. Pretreatments do not cause the seeds to germinate but make them able to germinate later when all the required conditions are met (Ahoton et al., 2009). Given the importance of the germination phase of seeds in the development of later stages of the development of all plant species, particularly in arid zones, it is essential to study the germination behavior of these species.However, very little work has been carried out on the study of seed germination of these spontaneous species in central eastern Niger.

The general objective of this study is to evaluate the effect of pre-treatments on the germination of four forest species in order to determine the best way to break integumentary dormancy.

II. Materials and Method

2.1 Study area

The study was conducted within the incubator of the environmental service of urban health and sustainable development of Bermo from August to November. The urban municipality of Bermo is located at 13°03’00” longitude North and 8°40’60” latitude East (Picture 1).



Picture 1: Map of Bermo departement

The department of Bermo has a hot and dry Sahelo-Saharan type climate. The maximum temperature is 44°C with a minimum of 22°C in 2016 (DDA Bermo, 2016), with average rainfall ranging from 200 to 250 mm per year depending on the season.The soils of Bermo are largely made up of sandy dune soils.There are also clay soils in the valleys, but also quartz deposits in the northern part of Akadaney between Amoulass and Tiguittout.

This area is made up of a clear wooded savannah with concentrations of trees in the depressions of the plateaus, the inter-dune valleys where the vegetation is very dense in the ponds. The herbaceous layer is relatively well developed and is variable according to the seasons and the years.

2.2. Method

2.2.1.Seed collection and experimental apparatus

For this study, four spontaneous species from the central eastern part of Niger were chosen.These species are of great importance from the point of view of ecosystem services, particularly provisioning and cultural (Saadou, 2009).

They were selected based on the availability of their seeds in the field. These species are: *Ziziphus mauritiana* lam, *Acacia tortilis* subsp.Raddiana, *Bauhinia refuscens* lamand *Sclerocarya birrea* (A. Rich.) Hochst.Seed collection was carried out directly from mother plants that were at the seed stage in central eastern Niger (Table 1).

Table 1: list of species sampled, its shape and source of seeds

Species	**Vernacular names (Haoussa)**	**Family**	**Form**	**Origin**
Acacia raddiana	Kandili, tamatchi	Mimosaceae	Ovoïde de couleur noir claire	Gadabedji.
Ziziphus mauritiana	Magaria, magariya	Rhamnaceae	Circulaire et plus petit que celles de *Sclerocarya birrea*	Bermo
Bauhinia rufescens	Dirga, Jirga	Caesalpinaceae	Rectangulaire et plus petit que les semences de *Ziziphus mauritiana*	Bermo
Sclerocarya birrea	Dania, daniya	Anacardiaceae	Circulaire et plus grande que toutes les semences citées ci-dessus en volume, poids et même la taille	Bermo

The device used is the Latin square, it is recommended on a homogeneous ground following the treatment gradient and an irrigation gradient. The Latin square device where there are as many rows as there are columns and as many repetitions as there are treatments (Table 2).Each row and each column are blocks and the distribution of processing is random within the blocks. At the end, each treatment appears once and only once per line and per column.For a test on a factor with levels and repetition, we have the following square of 16 blocks and the different treatments are affected by a draw on a total number of blocks (4 treatments).

Table 2: Diagram of the device used for a germination test

T1	**T3**	**T2**	**T0**
T2	T0	T3	T1
T0	T2	T1	T3
T3	T1	T0	T2

Device inside the block

E1	E3	E4	E2
E3	E1	E2	E4
E2	E4	E1	E3
E4	E2	E3	E1

Legend: T0: Control T1: scalding of seeds T2: treatment with lukewarm water for 48 hours T3: treatment with lukewarm water for 72 hours; E1: *Sclerocarya birrea*, E2: *Ziziphus mauritiana*, E3: ***Acacia tortiliu***, E4*: Bauhinia rufescens*

2. 2. 2. Pregermination treatments

The pre-treatment techniques used to break integumentary dormancy are:

- Boiling the seeds:the seeds have been immersed in boiling water which is immediately removed from the heat source and left to cool slowly for about 12 hours.The seeds soak up water and swell as the water cools. The proper ratio of water volume to seed volume is usually dictated by experience and can vary considerably between species.
- Warm water treatment: seeds are soaked in warm water for 48 or 72 hours before sowing.

The substrate was prepared using sand and manure collected from animal stables. The sand was mixed with manure and then added water.

2. 2. 3. Sowing and seedling care

The seeds were sown in polyethylene plastics and installed in a plot with a Latin square experimental device subdivided in rows and columns, each of which had 64 pots and each pot contained three seeds on an experimental perimeter of 1.8 m².

Watering began even before the installation of the device and was done twice a day (morning and evening), so the daily quantity of water used is 36 liters. Weeding was permanent and the young plants are safe from predators

2. 2. 4. Data collection and analysis

For the purpose of integumentary dormancy lifting, seed pre-treatments were performed and after performing the test on a heterogeneous substrate, data collection is also carried out.The emergence of the radicle is considered the start of germination.Observations and systematic counts were carried out daily and for 2 months.Thus, for this study, the germination parameters defined by Evenari (1957) and Côme (1968) were used to express the results of the germination test which are:

- The latency time or germination time is the time taken between sowing and the appearance of the first radicle, i.e. the first germination;
- The germination time is the time between the first and the last germination ;
- The germination rate is the time after which 50% of the seeds have germinated. $TMG=100* \sum n/\sum (n.jn)$

with n the number of seeds germinated on day j and jn the number of days after sowing.

- Le taux de germination ou capacité germinative ou encore pouvoir germinatif est la proportion de graines ayant germées pendant la durée de l'observation.

$TG= NG/NT *100$;

with NG the number of seeds germinated at the end of the experiment and NT the number of total seeds put into germination.

Statistical analysis of the data was done using SPSS and Minitab software. For the comparison of the means of the different seed lots, an analysis of variance (ANOVA) was carried out. Results are considered significant when $p < 0.05$ and Tukey's test was used for comparison of means.

III. Results

3. 1. Evolution of germination

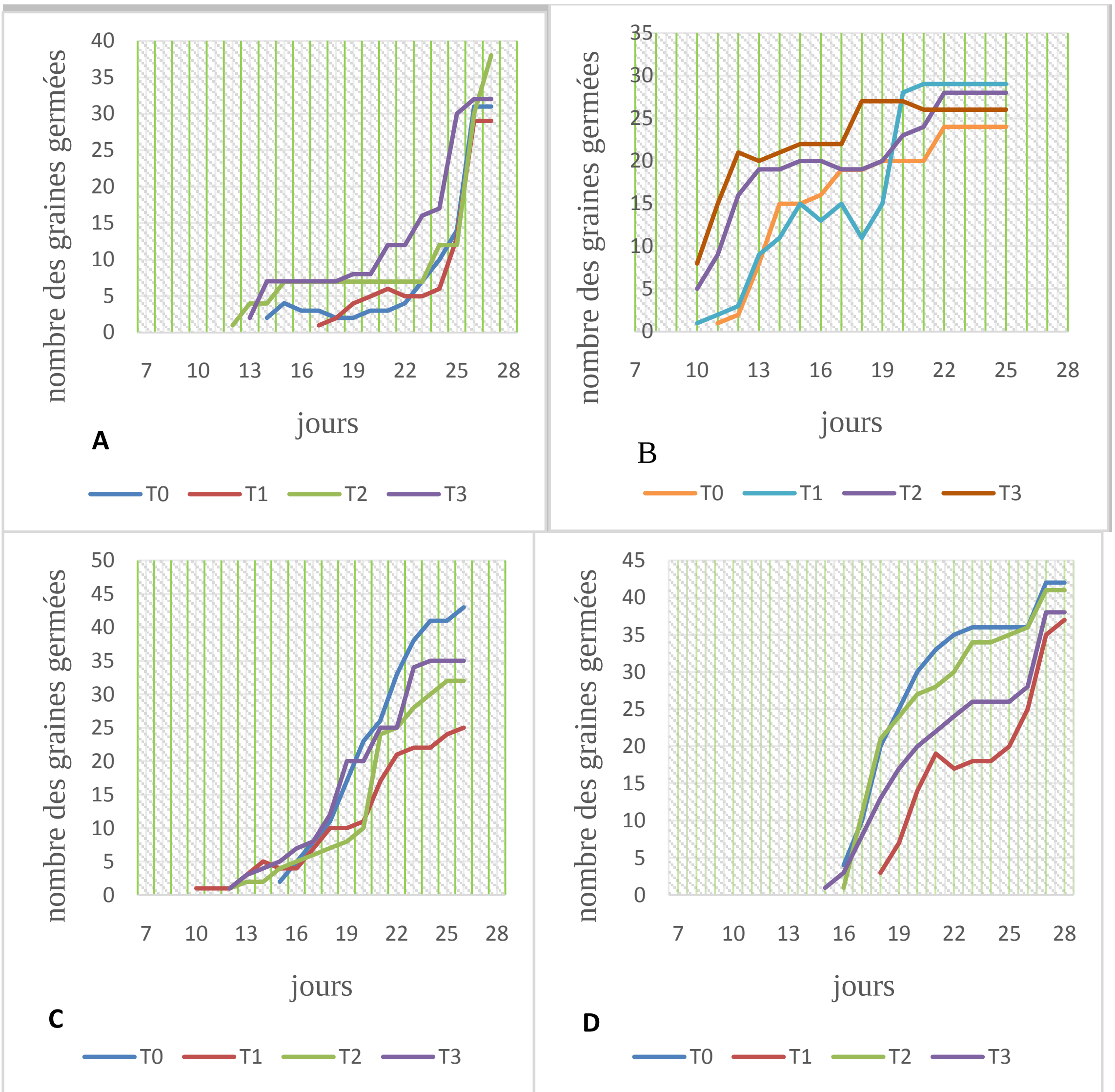
Figure 2 shows the evolution of the germination of the species studied(*Bauhinia rufescens; Acacia raddiana ; Ziziphus mauritiana ; Sclerocarya birrea*)on all treatments based on day.

For the *Bauhinia rufescens*, germination started on the 3rd day after sowing. Significant germination was recorded with the T2 treatment for two weeks, then followed by the T3 treatment. Thus the lowest germination was recorded with treatment T1 (boiling of the seeds) (Figure. 2 A).

For *acacia raddiana*, the third day after sowing was the start of germination. Thus, the first germination was observed and recorded at the level of T1 and also an important germination was recorded at the level of the same treatment (Figure 2B), followed by the T2 treatment. Finally, low germination was recorded with the control treatment (Figure 2B).

For the species *Ziziphus mauritiana*, the first germination was observed on the third day after sowing.The germination almost reached its maximum for the T0 control in a time interval of two weeks, followed by the T3 treatment and finally, the low germination was observed with the T1 treatment (Figure 2C).

For the species *Sclerocarya birrea*, there is no germination until the seventh day on all treatments after sowing. However, significant germination was recorded for the T0 control treatment (without any treatment) for a germination time of two weeks, followed by the T2 treatment.Finally, a minimum of germination was recorded with the T1(D) treatment.



Legend: T0: direct sowing T1: scalding of seeds T2: treatment with cold water for 48 hours T3: treatment with cold water for 72 hours.

Figure 2: seed germination curves of the species studied(A:*Bauhinia rufescens; B: Acacia raddiana;C: Ziziphus mauritiana;D: Sclerocarya birrea)*

The germination test for *Sclerocarya birrea* at the end of this study shows that the highest rate is the control followed by the T2 treatment with respectively 87.5% and 85.4%.The lowest rate was recorded for the T1 treatment with 77.1% (Table 3). Moreover, the analysis of variance shows that these differences are not significant.On the other hand, the treatment effect is significant (p=0.028) on the germination time. It is the highest with T1 and the lowest with T3. Similarly, significant differences were observed for germination rate.Thus, the multiple comparison test (analysis of variance) indicates that the differences between T1 for which the germination rate is the lowest with the other treatments. The duration of germination is significantly the highest with T3 and the lowest with T1.

Table 3: Results of the analysis of variance on the germination rate, germination delay,germination speed and germination duration of *Sclerocarya birrea*

Traitement	N	Taux de germination(%)	Délai de germination (jours)	Vitesse de germination (graine/jour)	Durée de germination (jours)
T0	4	87,5±10,8^{a}	9,3±1,0^{ab}	10,7±0,2^{b}	11,8±1,0^{ab}
T1	4	77,1±8,0^{a}	11,0±1,8^{b}	9,5±0,5^{a}	10,0±1,8^{a}
T2	4	85,4±14,2^{a}	9,5±0,6^{ab}	10,6±0,5^{b}	11,5±0,6^{ab}
T3	4	79,2±10,8 ^{a}	8,8±1,3^{a}	10,5±0,5^{b}	12,3±1,3^{b}

P-value	0,581	0,026	0,001	0,026

T0: direct sowing T1: scalding of seeds T2: treatment with cold water for 48 hours T3: treatment with cold water for 72 hours.

The results of this study on the Bauhinia refusal Lam germination test show high germination rates of 66.7% observed for all treatments except the control (T0) which recorded 64.6% (Table 4). Furthermore, the analysis of variance shows that there are no significant differences (p=0.991) between the different treatments.

For the germination delay, the highest was recorded for T1 and the lowest for T2 (Table 4). The effect of the treatment is also not significant on the germination time.The effect of the treatment is also not significant on the germination time. For the germination rate, non-significant differences were observed. Thus, the multiple comparison test does not indicate any significant difference between T1 for which the germination rate is the lowest with the other treatments.

Finally, non-significant differences were observed (p=0.199) for the duration of germination. The highest duration was observed with T2 and the lowest with T1.

Tableau 4 : Résultats de l'analyse de variance sur les taux de germination, délai de germination, la vitesse de germination et la durée de germination de *Bauhinia rufescens*

Traitement	N	Taux de germination(%)	délai de germination (jours)	Vitesse de germination (graine/j)	Durée de germination (jours)
T0	4	64,6±4,2[a]	9,8±3,2[a]	7,1±0,5[a]	14,2±3,2[a]
T1	4	66,7±11,8[a]	12,6±3,1[a]	6,9±0,7[a]	11,5±3,1[a]
T2	4	66,7±11,8[a]	7,8±1,7[a]	7,7±0,3[a]	16,8±2,1[a]
T3	4	66,7±9,64[a]	8,8±2,1[a]	7,7±0,5[a]	15,2±2,1[a]
P value		0,991	0,209	0,278	0,199

T0 : semis directT1 : ébouillantage des grainesT2 : traitement à l'eau froide durant 48 heures T3 : traitement à l'eau froide durant 72 heures.

The results of this study (Table 5) show that the *Ziziphus mauritiana* germination rate is the highest for the T0 control, followed by the T3 treatment. This rate is the lowest for the T1 treatment. Moreover, the statistical analysis of these results indicates that all these treatments applied are significantly identical (Table 5).Thus, the treatment effect is not significant on the germination time (p=0.737), it is highest with T0 and lowest with T3.On the other hand, non-significant differences were observed for the germination rate. Thus, the multiple comparison test indicates that the differences between T0 and T2 for which the germination rates are the lowest with the other treatments. The highest germination time was observed for the T1 and T2 treatments and the lowest was observed with the control treatment. The multiple comparison of these results indicates that all these treatments are significantly identical (p=0.736).

Table 5: Results of the analysis of variance on the germination rate, germination delay, germination speed and germination duration of *Ziziphus mauritiana*

Treatment	N	Germination rate(%)	Germination time (days)	Germination rate (seed/d)	Germination time (days)
T0	4	89,9±12,5[a]	9,3±1,3[a]	7,9±0,4[a]	9,8±1,3[a]
T1	4	52,1±19,7[a]	7,5±3,7[a]	8,2±0,6[a]	11,5±3,7[a]
T2	4	66,7±6,8[a]	8,0±1,8[a]	7,9±0,2[a]	11,3±2,2[a]
T3	4	72,9±7,9[a]	8,8±2,8[a]	8,0±0,4[a]	10,5±3,1[a]
P value		0,080	0,737	0,768	0,736

T0 : semis directT1 : ébouillantage des grainesT2 : traitement à l'eau froide durant 48 heures T3 : traitement à l'eau froide durant 72 heures

The germination test at the end of this study shows that the germination rate of *Acacia raddiana* is highest with the T1 treatment, followed by the T2 treatment. This rate is the lowest with the control T0, moreover, the statistical analysis indicates that all these treatments are significantly identical with p=0.531 (Table 6).

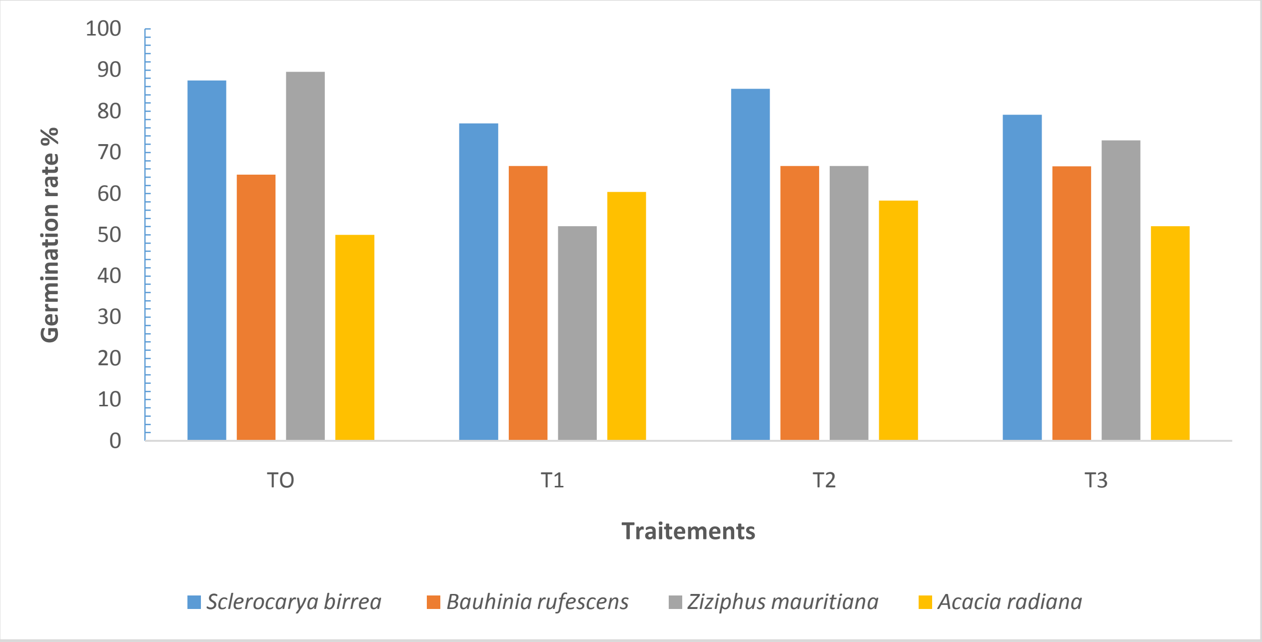
On the other hand, the treatment effect is significant (p=0.041) on the germination time. It is highest with T1 and lowest with T3 treatment. Indeed, significant differences were observed for the germination rate.Furthermore, the analysis of variance indicates the differences between T1 for which the speed is the lowest with the other treatments (Table 6). The duration of germination is significantly the highest with T3 and the lowest with T1 (p=0.041).

Table6: Results of the analysis of variance on the germination rate, germination delay, germination speed and germination duration of *Acacia raddiana*

Treatment	N	Germination rate(%)	Germination time (days)	Germination rate (seed/d)	Germination time (days)
T0	4	50,0±9,6^{a}	5,8±1,7^{a}	10,2±0,7^{a}	11,3±1,7^{a}
T1	4	60,4±8,0^{a}	6,5±2,9^{a}	9,8±1,6^{a}	10,5±2,9^{a}
T2	4	58,32±13,6^{a}	3,5±1,0^{a}	11,5±1,0^{ab}	13,5±1,0^{a}
T3	4	52,1±8,0^{a}	3,3±0,5^{a}	12,0±1,0^{b}	13,8±0,5^{a}
P value		0,531	0,041	0,014	0,041

T0 : semis directT1 : ébouillantage des grainesT2 : traitement à l'eau froide durant 48 heures T3 : traitement à l'eau froide durant 72 heures

The comparative analysis of the average germination rates of all the species according to the different treatments (figure 3) shows that these rates are fairly the same at the level of the controls T0 and T3 on each two species (*Sclerocarya birrea-Ziziphus mauritiana* and *Acacia raddiana -Bauhinia rufescens*).Thus, for treatments T1 and T2, the graph (figure 3) below shows us that all species, except *Ziziphus mauritiana* have approximately the same germination rates.

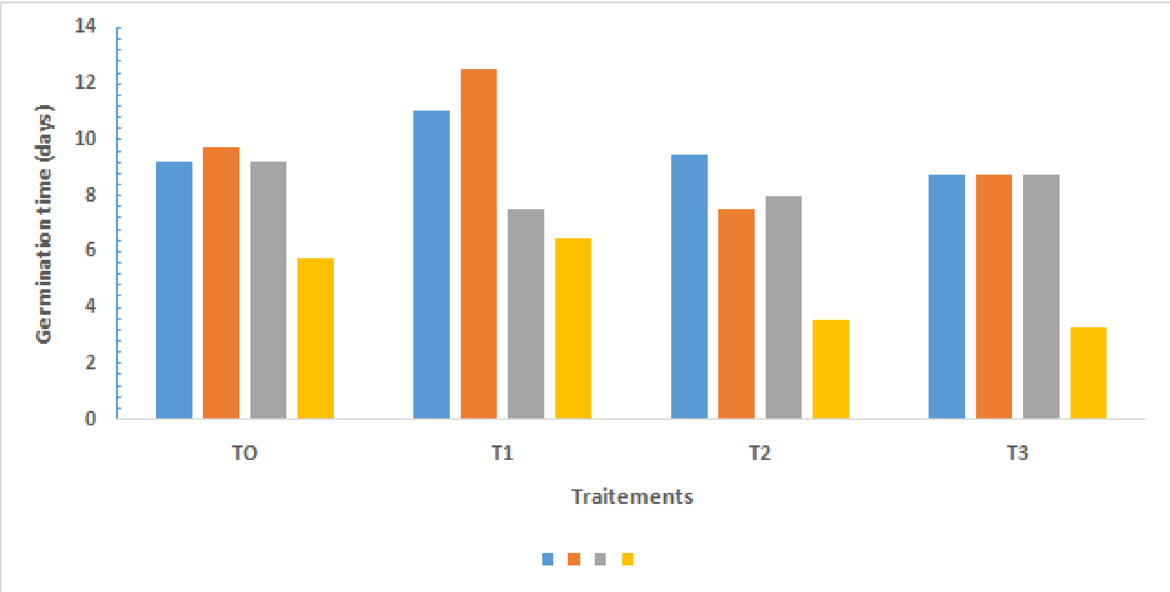


T0: direct sowing T1: scalding of seeds T2: treatment with cold water for 48 hours T3: treatment with cold water for 72 hours

Figure 3: variation of the germination rate according to the different treatments of the seeds of the species studied. Effects of pretreatments on the germination time of differents species.

Figure 4 shows a comparative analysis of the germination time of all species as a function of all the pretreatments applied. Thus, it emerges from this analysis that the average germination times are substantially the same at the level of the control and of the T3 treatment at the level of all the species except *Acacia raddiana* which has a short germination time which is respectively 5.75 days and 3.5 days for control and T3.

For the other two treatments (T1 and T2), approximate germination times were recorded for *Bauhinia rufescens*, *Acacia raddiana* and *Ziziphus mauritiana* with respectively 6.5; 7.5 and 8 days (Figure 5). Finally, it appears from this study that the longest delay was observed at the level of *Sclerocarya birrea* and *Ziziphus mauritiana* with 12.5 and 11 days respectively and all with scalding of the seeds and the shortest delay was recorded at the level of *Acaciaraddiana* for the two treatments (soaking in lukewarm water for 48 hours and 72 hours) with respectively 3.25 and 3.5 days.

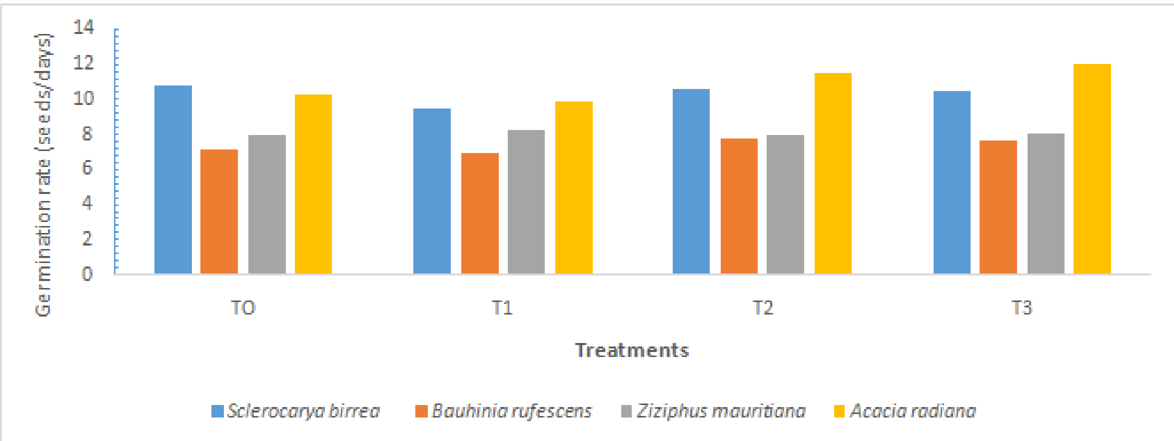


T0: direct sowing T1: scalding of seeds T2: treatment with cold water for 48 hours T3: treatment with cold water for 72 hours

Figure 4: Variation in germination time depends on the different treatments of the seeds of the species studied.

3. 2. Effects of pretreatments on the germination rate of different species

Figure 5 shows a comparative analysis of the germination rate of the different species according to all the treatments. Thus, it emerges from this very slow speeds on *Sclerocarya birrea* and *Acacia raddiana* on all the treatments (figure 5), for the two other species *Bauhinia rufescens*and *Ziziphus mauritiana* their germination speeds are approximately the same on all the pre-treatments. Thus, the average speed of rapid germination was recorded at the level of *Bauhinia refusecens* (6.87 days) for the treatment intended for scalding the seeds and the average speed of slow germination was recorded at the level of *Acacia raddiana* on the treatment intended for soaking in lukewarm water for 72 hours respectively 12 days.

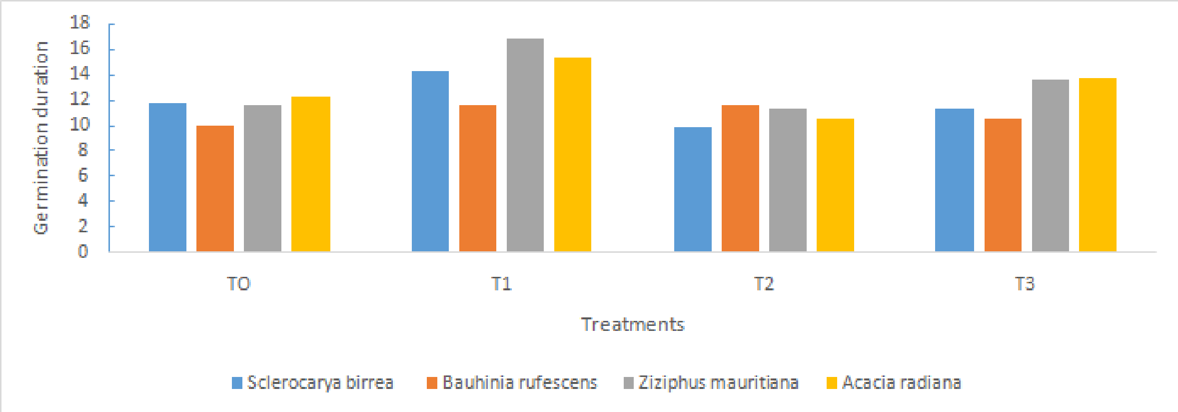


Légende : T0 : semis directT1 : ébouillantage des grainesT2 : traitement à l'eau froide durant 48 heures T3 : traitement à l'eau froide durant 72 heures

Figure 5: variation in germination rate according to the different treatments of the seeds of the species studied.

The comparative analysis of the germination rate of all the treatments on all the species (figure 6) shows that *Bauhinia rufescens*has a longer germination duration with a maximum of 16.75 days recorded for T1 than all the treatments of the other three species.

Acacia raddiana species with an average duration of 11.25 to 13.75 days for all treatments (Figure 12) comes second. For the other two species, approximately equal mean times were calculated for all treatments. Finally, the longest average germination time was recorded for the *Acacia raddiana* species and the shortest average time was calculated for *Ziziphus mauritiana.*



Légende : T0 : semis directT1 : ébouillantage des grainesT2 : traitement à l'eau froide durant 48 heures T3 : traitement à l'eau froide durant 72 heures

Figure 6: variation in the duration of germination according to the different treatments of the seeds of the species studied.

IV. Discussion

This study, which concerned four forest species (*Acacia raddiana, Bauhinia rufescens, Sclerocarya birrea and Ziziphus mauritiana*) in central eastern Niger, made it possible to highlight some characteristics of the germination of their seeds. Thus, the test results show significant germination rates greater than or equal to 50% for all treatments and also for all species.

A sometimes positive or negative variation was observed on some treatments (T1, T2, T3) of germination kinetics, despite these important germination powers, young pants are hardly observed in the natural environment. This is due to damage caused by insect pests that graze or desilt the young shoots until they dry out.Under normal experimental conditions, the germination kinetics of forest species is known with a more or less linear evolution. No significant difference ($p>0.05$) between dormancy breaking treatments was observed in the germination rates of these species. For scalding the seeds of the species tested, their germination rates (52.1%; 60.42%; 66.68%; 77.07%) are similar to the rates of 70–80% reported by Ahoton *et al*., (2009) on *Prosopus africana* when the seeds are boiled. Thus, more or less similar germination rates are also obtained with other species whose seeds have undergone pretreatments: 80% with *Prosopus juliflora* (Maydell*et al*., 1983), and 85% with *Hyphaene thebaica* (Moussa*et al*., 1998).

It should be noted that the seeds subjected to thermal shocks (boiling water) did not germinate because the embryo was probably damaged during this treatment (Alain *et al.*, 2017). This is confirmed by the work of Dan guinbo *et al. (*2011) on the seeds of *Neocarya macrophylla* for hot water treatment and also those of Alain *et al.*, (2017) on seeds of*Grewia corriacea* for scalding seeds. Indeed, the prolonged soaking of the cores in boiling water for 15, 30, 60 minutes would have allowed the penetration of the excess water inside the cores through the cracks created by the thermal shock (Alain *et al.*,2017). This penetration of water would have repressed the expression of the embryo thus explaining the inhibition of germination. On the other hand, thermal shocks (boiling water) improved seed germination in *Acacia tortilis* (Wahbi *et al*.,2010). This difference in reaction would be explained by the nature of the integuments. The results found in this study also confirm the work of Konaté (1987) on seeds germination of *Acacia senegal*, *Bauhinia rufescens*and *Prosopus juliflora*with a germination rate of 87%, 81% and 87% respectively.

As regards the soaking of seeds in water during 48h of the four tested species, the results of the germination rates obtained (58,32%, 66,68%, 66,68% et 85,42%) are conforms with those found by Konaté (1987) (84%, 56%) in his study "the influence of the temperature and the light on the Germination of the seeds of*Ziziphus mauritiana* and*Jatropha curcas*and alsothe study of the pre-treatments to be applied for the germination of the seeds of *Acacia senegal, Bauhinia rufescens*and*Prosopus juliflora* ».

This study identified a variation in germination rates (79.17%; 66.65%; 72.93%; 52.07%) of all species when these seeds were subjected to soaking in water for 72h.Note that all these results have no significant difference with $p > 0.05$.*Sclerocarya birrea*, and *Acacia raddiana* on all treatments. Finally, the analysis of variance shows non-significant differences ($p < 0.05$) for the two other species on all treatments. For the germination rate, the results of the study are similar to those of Konaté *et al*. (1987) who recorded, for the germination trials of *Acacia Senegal*, *Bauhinia rufescens* and *Prosopus juliflora*, respectively 6, 8, and 10 days of germination duration for the hot water treatment. In the present study, the analysis of variance shows a highly significant difference ($p<0.05$) for the speed of germination at the level of two species namely *Sclerocarya birrea*and *Acacia raddiana* for all the treatments while there is no has no significant difference ($p>0.05$) for the other two species on the pretreatments.

For the duration of germination, it appears from the statistical analysis a highly significant difference ($p<0.05$, appendix 1) between *Sclerocarya birrea* and *Acacia raddiana* with all the treatments and duration of germination ranging from 10 to 14 days. Finally, for other species, the difference is not significant for all the treatments which recorded a germination time of 10 to 17 days.

V. Conclusion

In the Sahelian zone, the need to promote the cultivation of useful forest species to meet the needs of rural communities is proving increasingly necessary.For seeds of some species, germination is a process that can sometimes last for days or even weeks.This situation which is incompatible with a homogeneous production of plants in the nursery.

This study shows that for all the species studied, there is no significant difference in the germination rates with all the pretreatments applied. The comparison between the pretreatments did not show significant differences ($p<0.05$) for the three calculated parameters (germination duration, germination rate and germination delay) at the level of *Sclerocarya birrea* and *Acacia raddiana* for all types pre-treatments (soaking in lukewarm water for 48 and 72 hours, boiling the seeds and also the control).Thus, for all the species, a germination rate greater than 50% is obtained even without pretreatment, which constitutes a good indicator in the reforestation process with these four species.

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