EFFECT OF SEEDING DEPTH ON EMERGENCE OF *ARGANIA SPINOSA* (L.) MAIRE

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SUMMARY

Large areas that were once dominated by argan trees [*Argania spinosa* (L.) Maire] have been depleted by heavy use, and the remaining argan trees are threatened by overgrazing and mismanagement. This situation is exacerbated by the limited ability of argan trees to self-regenerate. Argan seeds have hard seedcoat and require high moisture conditions to imbibe and germinate. Because of the lack of information on argan, particularly on establishment, an experiment was conducted to study the effect of planting depth on germination and emergence of this species. Plastic pots, 8x15 cm, were filled with a clay soil (vertisol) and two seeds were planted in each pot. Five planting depths were tested: 0, 2, 4, 6, and 8 cm. Treatments were laid out in randomized complete blocks with nine replications. Emergence of *Argania spinosa* was monitored every other day for two months. Seeds that did not emerge were washed free of soil and examined. The final emergence counts were expressed as percentages of initial seeds planted and a standard analysis of variance was performed on the data. The results show that seeds did not germinate when surface-sown. When planted at 8 cm depth, argan seeds germinated but seedlings could not emerge. Over the range 2 to 6 cm, the relationship between planting depth and emergence was linear. Maximum emergence was obtained from 2 cm depth. This may explain why seeds that fall from argan trees do not establish. They have to be covered and require high moisture conditions to germinate and emerge.

Key words: *Argania spinosa*, emergence, seeding depth.

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RESUME

L'arganier est en voie de disparition du fait d'une utilisation excessive. Cette situation est d'autant plus critique que les possibilités de régénération de cette espèce sont limitées. Les semences de l'arganier nécessitent des conditions optimales d'humidité pour germer ce qui n'est pas toujours le cas dans les régions à arganier. En raison du manque d'information sur l'installation de l'arganier, cette expérience a été conduite afin d'étudier l'effet de la profondeur de semis sur la germination et la levée de cette espèce. Des pots en plastique 8x15 cm ont été remplis avec un sol argileux (vertisol) et deux graines d'arganier ont été plantées par pot. Cinq profondeurs de semis ont été testées: 0, 2, 4, 6, et 8 cm. Les traitements ont été arrangés en blocs aléatoires avec neuf répétitions. La levée a été notée tous les deux jours sur une durée de deux mois. Les semences qui n'ont pas levé ont été lavées et examinées. Le comptage final de la levée a été rapporté comme pourcentage du nombre initial de semences plantées. Les résultats montrent que les semences d'arganier placées en surface n'ont pas germé. De plus, les semences plantées à 8 cm de profondeur ont germées mais n'ont pas levé. Dans l'intervalle 2 à 6 cm, la relation entre profondeur de semis et levée a été linéaire. Le maximum de levée a été obtenu à des profondeurs de 2 cm. Ceci peut expliquer le fait que les semences qui tombent des arbres d'arganier ne germent pas. Elles doivent être couvertes et nécessitent des conditions d'humidité élevée pour germer et lever.

Mots clés: *Argania spinosa*, levée, profondeur de semis.

INTRODUCTION

Argan [*Argania spinosa* (L.) Maire], a long-lived tree, is endemic to Morocco (Nègre 1962). It covers an area of 800,000 ha in the southwest (M'Hirit 1990) and grows on various soils (Rieuf 1962) under 100 to 400 mm of annual precipitations. Because of highly variable rainfall in these areas, the argan tree has become a stabilizing element of the ecosystem and has developed into a key component of the social and economic survival of local populations. Emberger (1938) stated "If the southwest of Morocco is still covered with trees, it is because the argan tree has imposed itself and earned people's respect by the services it provides." Argan tree is used for many purposes: wood is used for charcoal, fruits are used to extract oil that is consumed by local populations and sold all over Morocco, and leaves are fed to livestock. However, and because of heavy use,large areas that were once dominated by argan trees have been depleted. The remaining argan trees and many understory

species are threatened by overgrazing and mismanagement. This situation is exacerbated by the limited ability of argan trees to self-regenerate. Argan seeds have hard seedcoats and require high moisture conditions to imbibe and germinate, the soil has to be near field capacity during germination (Arif, unpublished data).

Because of lack of information on argan establishment, an experiment was conducted to study the effect of planting depth on germination and emergence of this species.

MATERIALS AND METHODS

The experiment was conducted in a greenhouse at the Aridoculture Center at Settat. Seeds of *Argania spinosa* were collected near Essaouira. Plastic pots, 8x15 cm, were filled with a clay soil (vertisol), and two seeds were planted in each pot. Five planting depths were tested: 0, 2, 4, 6, and 8 cm. Treatments were laid out in randomized complete blocks with nine replications. Soil in pots was maintained near field capacity to enhance germination of *Argania spinosa*. The experiment was started on 22 December 1992 and concluded on 20 February 1993. It was repeated between October 1 and December 2, 1993. Temperature within the greenhouse varied between 7 and 23 °C during the first experiment, and 12 and 22 °C during the second. Seedling emergence was monitored every other day for two months. Seeds that did not emerge were washed free of soil and examined. The final emergence counts were expressed as percentages of initial seeds planted and a standard analysis of variance was performed on the data. The least significant difference test or the orthogonal contrasts were used to separate treatment means (Steel and Torrie 1980).

RESULTS AND DISCUSSION

Response to depth treatments was consistent over both experiments, and results were thus combined (Table 1). Emergence from the 2 cm planting depth was significantly higher than that from the other depths and averaged 86%. No emergence occurred from the 0 cm depth treatment. Seeds planted 8 cm deep produced seedlings but the final counts were not significantly different from zero. After examination, seeds planted at 8 cm did germinate but seedlings could not emerge. Rate of emergence as shown by figure 1 was also different among treatments. The deeper the planting, the longer it took seedlings to emergence. This is shown by the strict linear relationship between planting depth and time to first and to maximum emergence (Table 2).

Table 1. Effect of seeding depth on emergence (%) of *Argania spinosa*

Depth (cm)	First experiment	Second experiment	Combined experiments
	% of emergence		
0	0.0	0.0	0.0
2	88.9	83.3	86.1
4	50.0	77.7	63.9
6	16.7	33.3	25.0
8	5.6	0.0	2.8
LSD 5%	18.1	19.4	18.1

Table 2. Number of days to emergence of Argan seedlings

Depth (cm)	First emergence	Maximum emergence
	days	
2	26	27
4	35	36
6	45	45
Contrasts		
Linear	**	**
Quadratic	ns	ns

** significant at the 1% probability level

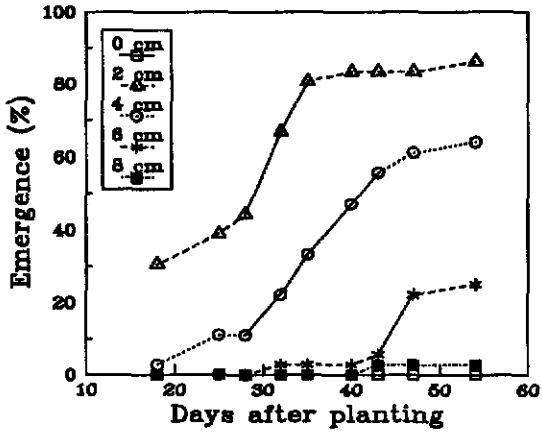

Fig. 1 Emergence of argan seedlings from different seeding depths

CONCLUSION

The present study shows that argan seeds do not germinate when surface-sown, and do not emerge when planted 8 cm deep. Maximum emergence was obtained when seeds were planted 2 cm deep. This may explain why seeds that fall from argan trees do not establish. They have to be covered and require high moisture conditions to germinate and emerge.

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