Ferhat Abbes University Sétif -1-

Faculty of Natural and Life Sciences

Department of Ecology and Environment

الجمهورية الجزائرية الديمقراطية الشعبية وزارة التعليم

العالي والبحث العلمي

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Thesis

Presented by

Chenaf Belkis

Koraiba Bouchra

Meddour Amira

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Before the Jury:

PRESIDENT : Ms. HACHMAOUI Karima MCA UFA Sétif1

SUPERVISOR : Mr. MISSOUI Khaled MCA UFA Sétif1

EXAMINER : Ms. GHIT Karima MCB UFA Sétif1

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DEDICATION

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Dedication

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"For nothing is built without hands that support, and hearts that believe."

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Abstract

This study aims to compare the condition of *Quercus ilex* (Holm oak) maquis stands in the Djebel Anini region (Aïn Roua), in order to assess the impact of various environmental and anthropogenic factors on the health and development of this Mediterranean forest species. A dendrometry and physiological survey was conducted across 10 sampling plots (30 m × 30 m), randomly distributed in areas with marked ecological diversity (sun exposure, soil type) and varying levels of human disturbance (proximity to quarries, presence or absence of past silvicultural interventions).

For each sampled tree, several indicators were measured: total height, diameter at breast height (DBH), presence or absence of buds, leaf volume and color, and crown condition, evaluated using a scale from 0 to 4.

The results reveal significant differences between the stations, particularly related to exposure (north/south, sun/shade) and human pressures such as quarrying . Some trees show clear signs of environmental stress, including sparse crowns, poor fruiting, and leaf discoloration, suggesting progressive weakening.

These findings highlight the urgent need for site-adapted forest management and pave the way for further research on the combined effects of climate change and human activities on the resilience of Quercus ilex forests in semi-arid environments.

الملخص

تهدف هذه الدراسة إلى مقارنة حالة الاجنة من البلوط الأخضر *(Quercus ilex)* في منطقة جبل عنيني (عين الروى)، بهدف تقييم تأثير العوامل البيئية والأنشطة البشرية المختلفة على صحة ونمو هذه الشجرة الغابية المتوسطية. تم إجراء مسح فسيولوجي عبر 10 مربعات مساحية (30 م × 30 م)، موزعة عشوائيًا في مناطق ذات تنوع بيئي واضح من حيث التعرض لأشعة الشمس، نوعية التربة، ودرجات التداخل البشري (مثل قربها من المحاجر أو وجود تدخلات غابية سابقة).

بالنسبة لكل شجرة تم أخذ عينتها، تم قياس عدة مؤشرات: الارتفاع الكلي، القطر على ارتفاع الصدر(DHP) ، وجود أو غياب البراعم، حجم ولون الأوراق، بالإضافة إلى حالة التاج النباتي التي تم تقييمها باستخدام سلم من 0 إلى 4.

تكشف النتائج عن تباينات كبيرة بين المحطات، خاصة فيما يتعلق بالتعرض (شمال/جنوب، ظل/شمس) والضغوط البشرية مثل المحاجر. وتظهر بعض الأشجار علامات واضحة على الإجهاد البيئي، مثل التيجان العارية، ضعف الإثمار، وتغير لون الأوراق، ما يدل على ضعف تدريجي في الحالة الصحية.

تسلط هذه الملاحظات الضوء على الحاجة الملحة إلى إدارة غابية تتناسب مع خصوصيات الموقع، وتفتح آفاقًا لأبحاث مستقبلية حول التأثير المشترك للتغيرات المناخية والنشاط البشري على قدرة غابات البلوط الأخضر على الصمود في البيئات شبه القاحلة.

Résumé

Cette étude vise à comparer l'état des peuplements de maquis à chêne vert (*Quercus ilex*) dans la région du Djebel Anini (Aïn rwa), dans le but d'évaluer l'influence de divers facteurs environnementaux et anthropiques sur la santé et le développement de cette essence forestière. Pour ce faire, un inventaire dendrométrique et physiologique a été réalisé sur 10 parcelles d'échantillonnage de 30 m × 30 m, sélectionnées de manière aléatoire dans des zones présentant une forte hétérogénéité écologique (exposition au soleil, nature du sol), ainsi que des niveaux de perturbation humaine variables (proximité de carrières, présence ou absence d'interventions sylvicoles passées).

Pour chaque arbre échantillonné, plusieurs paramètres ont été mesurés : la hauteur totale, le diamètre à hauteur de poitrine (DHP), la présence ou l'absence de bourgeons, le volume et la couleur des feuilles, ainsi que l'état du houppier, évalué selon une échelle de 0 à 4.

Les résultats mettent en évidence une variabilité significative entre les stations, notamment en lien avec l'exposition (nord/sud, ombre/soleil) et les pressions anthropiques telles que les carrières. Certaines stations révèlent des signes marqués de stress environnemental : houppiers dégarnis, faible fructification, jaunissement du feuillage, indiquant un affaiblissement progressif de certains arbres.

Ces observations soulignent la nécessité d'une gestion forestière adaptée aux conditions locales, et ouvrent la voie à des recherches plus approfondies sur les effets combinés du changement climatique et des activités humaines sur la résilience des écosystèmes forestiers à chêne vert en milieu semi-aride.

Riassunto

Questo studio ha l'obiettivo di confrontare lo stato dei popolamenti di macchia a leccio (*Quercus ilex*) nella regione del Djebel Anini (Aïn Erwa), al fine di valutare l'influenza di vari fattori ambientali e antropici sulla salute e lo sviluppo di questa specie forestale mediterranea. È stato condotto un rilievo dendrometrico e fisiologico su 10 parcelles di campionamento (30 m × 30 m), distribuite casualmente in aree con notevole diversità ecologica (esposizione al sole, tipo di suolo) e differenti livelli di disturbo umano (prossimità a cave, presenza o assenza di interventi selvicolturali precedenti).

Per ciascun albero campionato, sono stati misurati diversi parametri: altezza totale, diametro a petto d'uomo (DBH), presenza o assenza di gemme, volume e colore delle foglie, e stato della chioma, valutato secondo una scala da 0 à 4.

I risultati rivelano differenze significative tra le stazioni, in particolare in relazione all'esposizione (nord/sud, ombra/sole) e alle pressioni antropiche come le attività estrattive . Alcuni alberi mostrano segni evidenti di stress ambientale, tra cui chiome rade, scarsa fruttificazione e decolorazione fogliare, indicando un progressivo indebolimento.