Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

STUDIES REGARDING THE IDENTIFICATION OF SOME SOLUTIONS FOR THE RENATURATION OF FOREST LANDS WHICH HAVE BEEN USED FOR THE GROWING OF PHEASANTS

Mircea Moldovan[1], Ioan Tăut[1, 3], Vasile Șimonca[1, 3], Cristinel Constandache[2*], Laurențiu Popovici[2], Ciprian Tudor[2]

[1] "Marin Drăcea" National Institute for Research and Development in Forestry Cluj, Romania
[2] "Marin Drăcea" National Institute for Research and Development in Forestry SCDEP Focșani, Romania
[3] University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

Abstract
In Romania, great importance has been given to growing pheasants, for the repopulation of hunting funds. This activity is carried out in a semi-intensive or semi-natural system. The area where the farms are located must have the following characteristics: the soil must be permeable, must be raised to prevent water stagnation, must be protected from strong winds, must provide shade especially at noon, must be in the quietest areas possible, and last but not least, be suitable for effective disinfection and rodent control.
Due to the location conditions and the very large number of birds per surface unit that produce large amounts of bird droppings material, over time, it accumulates in the soil, becoming a limiting factor for the installation of future stands.
In the present work, a study was carried out with the objective of establishing the main species that will be used for the afforestation of a land with an area of approx.6 ha, former pheasantry located in Bihor county. Detailed soil analyzes were necessary to substantiate the solutions. Thus, amounts of potassium and phosphorus far above the optimal amount were determined, and the hydro-physical characteristics of the soil were strongly affected, requiring special pedoameliorative works.

Keywords: afforestation, Plain, oak,

1. INTRODUCTION

In Romania, great importance has been given to growing pheasants, for the repopulation of hunting funds. This activity is carried out in a semi-intensive or semi-natural system.
The area where the farms are located must have the following characteristics: the soil must be permeable, must be raised to prevent water stagnation, must be protected from strong winds, must provide shade especially at noon, must be in the quietest areas possible, and last but not least, be suitable for effective disinfection and rodent control (Gheța et al., 2020).
Due to the location conditions and the very large number of birds per surface unit that produce large amounts of bird droppings material, over time, it accumulates in the soil, becoming a limiting factor for the installation of future stands.
The effects on soil chemistry may persist even after gamebird release has ceased and alter floral populations in following years (Madden et al., 2020). A study of the possible recovery of ground

*Corresponding author, E-mail address: cicon66@yahoo.com

Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

floras and soils in abandoned or disused pheasant release pens was undertaken over three years. Capstick et al. (2019) compared the soil chemistry, soil flora structure and community composition of abandoned release sites in 65 ancient semi-natural forests with nearby paired control sites in the same forest with no history of existence.
A widely used substitute to abandoned farmlands is afforestation, often trough planting stands of single or small sets of non-native and native tree species of forestry interest, as opposed to the often slower natural regeneration of native woodland (Nablea et al., 2020, Wang et al., 2023).
For the accomplishment of afforestation it is necessary to know all the factors involved (biotic and abiotic) of the planting area that can limit development of the new forest cultures (Tăut et al., 2018, Moldovan et al., 2020).
In the present paper, a study was carried out with the aim of establishing the main causes that complicate the process of land renaturation in the plain area.

2. MATERIALS AND METHODS

The area where the studies were conducte is near the city of Oradea, bordering the locality of Pauș a (fig. 1). The studied area in surface of 6,17 hectares is classified as a national forest fund, in the past it was used for forestry production (raising pheasants).

Figure 1. Location of the land under study

Within this area, afforestation works were carried out using the afforestation composition 40% oak 40% Turkey oak, 10% red oak, 10% ash in the years 2020, 2021 and 2022, each year the crop completely dried out.
For this reason, in order to establish the premises for the establishment of technical afforestation solutions that would result in valuable and stable stands in the studied area, there was a need to establish the main current and past biotic and abiotic factors, with limiting action on the establishment and development of silvicultural crops.
Thus, the relief was analyzed, in accordance with the geological and geomorphological factors, the main climatic elements (temperatures and precipitation) both current and historical and there were

*Corresponding author, E-mail address: cicon66@yahoo.com

Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

identified the main disruptive factors that have caused and are causing damage to the stands and crops in the nurseries.

3. RESULTS AND DISCUSSIONS

3.1. Conditions of the relief formation

From a geological point of view, the territory is part of the Banato-Crisana Plain, the high plain, the sector of the subhill plains between Someș and Crișul Alb being characterized by a Pliocene-Quaternary sedimentary cover, with variable thicknesses, covering a crystalline foundation.
The substrate is made up of a sequence of polycene fluvial-lacustrine deposits (clays, sands, gravels), over which a layer of Pleistocene alluvial-proluvial materials was deposited.
The high plain (forest subunit) is found between the steppe - forest-steppe area of the Banato-Crișana plain and the Crișana Hills, being an intermediate area with altitudes between 120 and 200 meters, with a reduced slope from east to west.
The layout of the bordering territory of the subcarpathian hills, associated with the high altitude for the plain area, favors the establishment of forest vegetation, especially on luvisols, in the form of clumps of oaks (Turkey oak, Hungarian oak, oak) mixed with linden and hornbeam.

3.2. Climate conditions

From a climatic point of view, the studied area belongs to the area of high plain topoclimates with a moderate continental climate.

Thermal regime

The average annual temperature on the studiated area is 10.2 Celsius degrees according to current data and 10.6 Celsius degrees according to historical data-1960-2000.
Average monthly temperatures, in the period 2000-present, are on a slightly decreasing trend, with the highest values being recorded in the months of May and July (fig. 2).
As for seasonal averages, the trend is maintained, except for autumn, when the difference is in favor of the current period (fig 3).

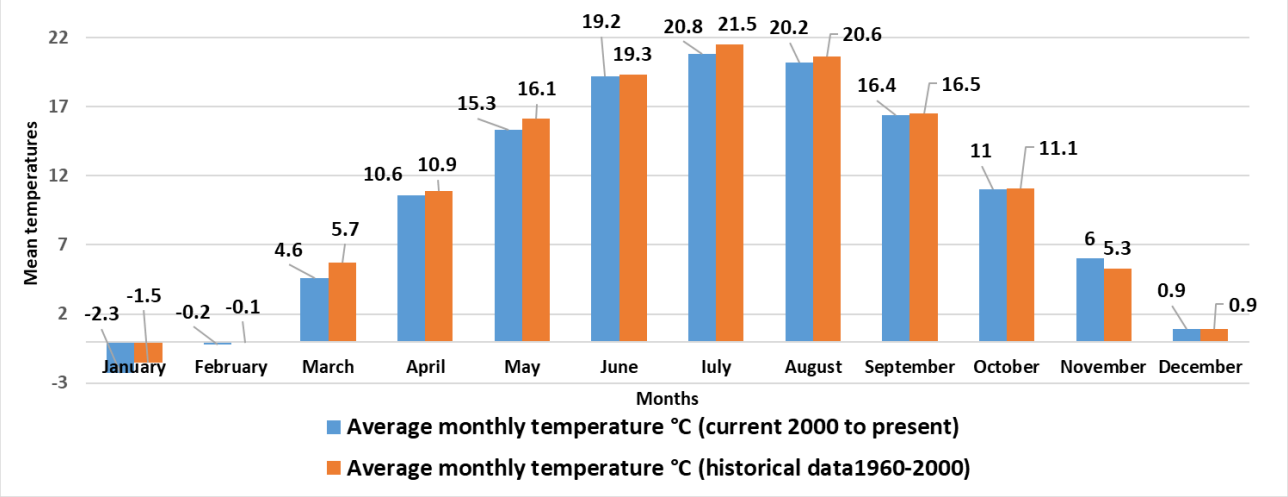

Figure 2. Average monthly temperature (Celsius degrees) current and historical

*Corresponding author, E-mail address: cicon66@yahoo.com

Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

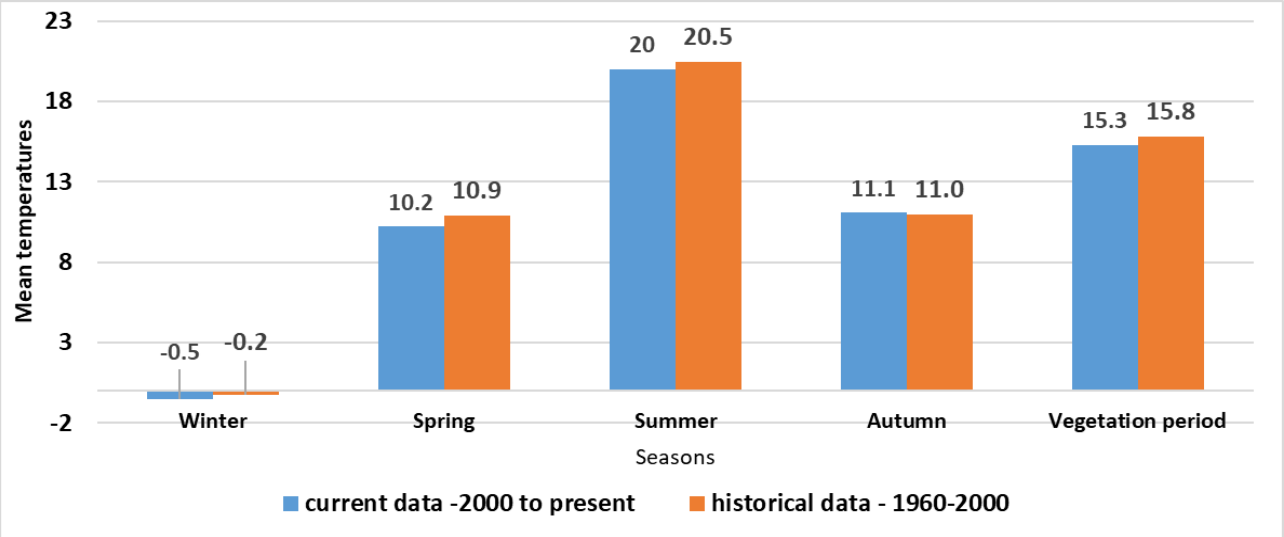

Figure 3. Average temperature by season and growing season (Celsius degrees) current and historical

Rainfall regime

Annual rainfall is around 602 mm according to current data and 634.4 mm according to historical data-1960-2000.

The multi-monthly precipitation from the period 2000 to the present is, as in the case of temperatures, on a decreasing trend, except for the precipitation in winter, when the trend is increasing compared to the historical values from the period 1960-2000 (fig. 4).

During the vegetation period, the amount of precipitation is in the period 2000 present is 8.8% lower than the historical one, and during the winter the amount is 17% higher in the current period compared to the historical one (fig. 5).

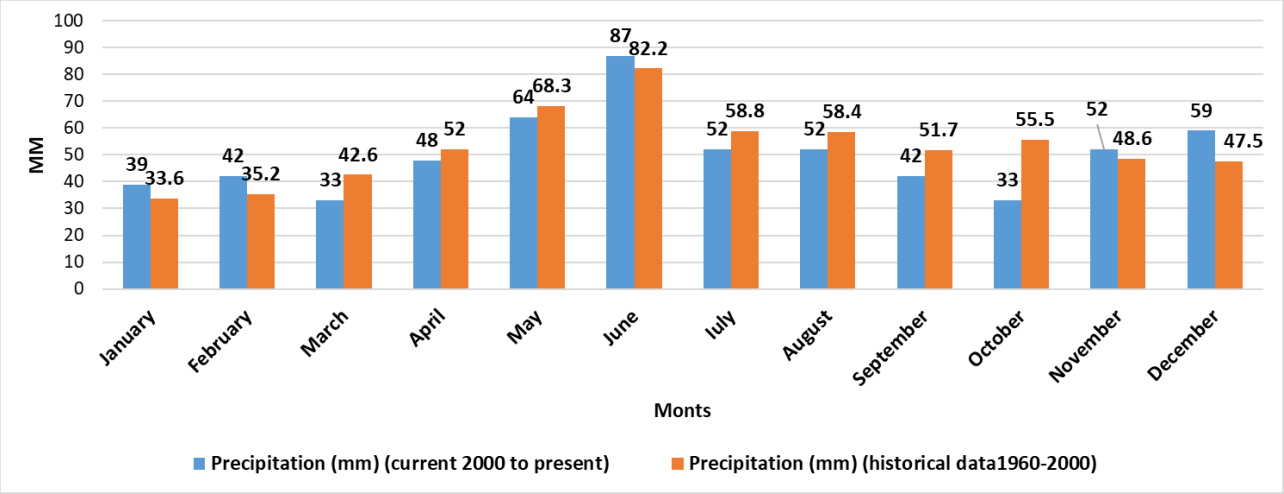

Figure 4. Average amount of precipitation per month (mm) current and historical

Historical climate data were taken from Geographical Monograph of Romania 1960, Climatological atlas of the Socialist Republic of Romania, 1966, Geography of Romania I, 1983, and those related to the period 2000 to present, from the Oradea weather station.

*Corresponding author, E-mail address: cicon66@yahoo.com

Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

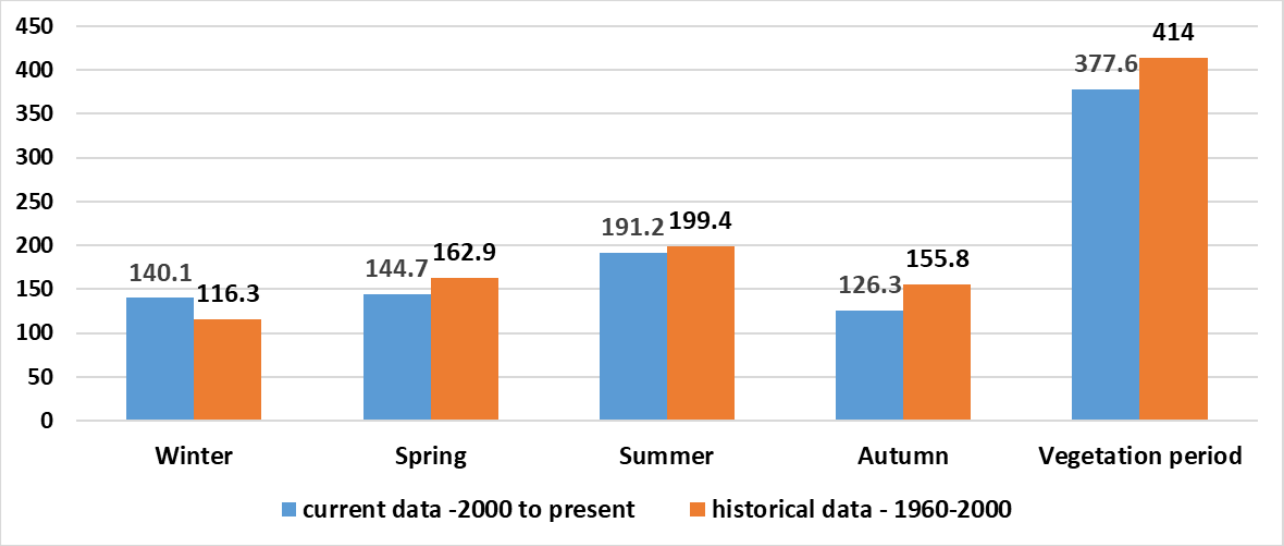

Figure 5. Average amount of precipitation by season and growing season (mm) current and historical

3.3. Bioclimatic zonation

Analyzing the results regarding the relief formation conditions and the climatic conditions, the bioclimatic zoning could be established.

The studied area is found within the Forest Plain (CF), which is located in the high plain area interspersed with the zone of the low hills (FD1) and the forest-steppe (SF). Characteristic of this zone is the fact that the main zonal forest formations (Oak stands, Turkey oak stands, Hungarian oak stands, their mixtures, as well as plain mixed hardwood forest) appear on the interfluves, and the intrazonal forest formations (poplar stands, willow stands, alder stand) appear on river meadows and on the low terraces.

The stands in this bioclimatic zone, respectively in the west and north-west of Romania, have suffered, over time, from cumulative limiting factors, leading to significant damage to the national forest fund.

3.4. The main disruptive factors

Among the most important factor that led to favoring the appearance of negative factors in the forests of this area is represented by afforestation carried out with monocultures of oaks or oak cultures mixed with secondary species but the last with very small proportions (10–20%) (fig. 6, 7).

The monocultures installed in the plain area are often affected by various biotic and abiotic factors, these stands being vulnerable, over time ending up being devitalized, reaching dryness.

A limiting factor in the process of obtaining some stands through plantations on lands that had other uses than forest, frequently encountered in all stands in the plain area, is the phenomenon of drying at the level of the crown, whether it is about leaves or stems.

Another generalized phenomenon is the drying of thin branches with a diameter of less than 5 cm, in a proportion of less than 20% of the total crown, a phenomenon that can be considered as a warning signal of the onset of decline (fig. 8, 9).

*Corresponding author, E-mail address: cicon66@yahoo.com

Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

This symptom is encountered with great frequency in oaks, hornbeam and ash in lowland forests.

Figure 6. Oak monoculture

Figure 7. Oak monoculture detail

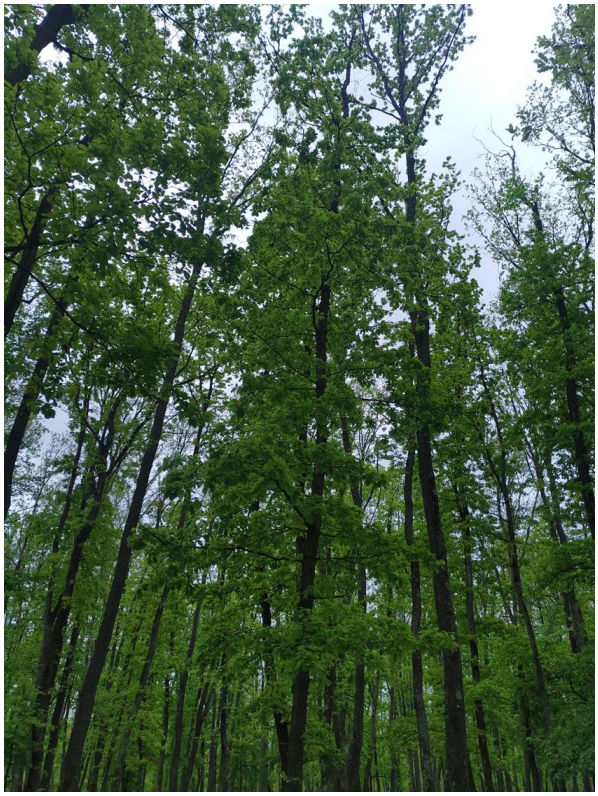

Figure 8. Crouwns with dryied brunches

Figure 9. Crouwns with dryied thinner brunches

Other limiting factors are the biotic ones, respectively diseases and pests, which, over time, have caused significant damage to the forest fund.

*Corresponding author, E-mail address: cicon66@yahoo.com

Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

Between the years 2012 and 2022, the pests *Lymantria dispar (fig 12), Tortrix viridana (fig. 10), Geometridae (fig. 11)* produced, combined, significant damage to the oak stands in the western and northwestern part of Romania, in 2014 aerial treatments were required.
The defoliator that produced the most important damage was *Lymantria dispar*.

Figure 10. Tortrix viridana larva

Figure 11. Operophtera brumata larva

Figure 12. Lymantria dispar larva

Among the diseases, we can mention oak powdery mildew caused by the pathogen *Erysiphe alphaloides (fig. 13)*, which attacks especially young oak saplings from both natural regenerations and nurseries, and the control of this pathogen is extremely difficult to carry out.
Another pathogen that causes significant damage to cherry seedlings is *Blumeriella japii (fig 14)*.

Figure 13. Presence of powdery mildew on oak seedlings

Figure 14. Presence of Blumeriella japii on forest cerry seedlings

The need for oak saplings being high, the pathogen *Erysiphe alphitoides* was encountered annually in nurseries and young crops in the field, causing significant damage, especially where fungicide treatments were not applied. Controlling and combating this pathogen is increasingly difficult due to its adaptation to changing environmental conditions, as well as the prohibition of fungicides that have been highly effective.
The pathogen Blumeriella japii is also found in the same situation, only that cherry crops are much smaller than oak crops.

*Corresponding author, E-mail address: cicon66@yahoo.com

Current Trends in Natural Sciences
Vol. 12, Issue 23, pp. 118-125, 2023
https://doi.org/10.47068/ctns.2023.v12i23.013
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

4. CONCLUSIONS

Within this area, afforestation works were carried out using the afforestation composition 40% oak 40% Turkey oak, 10% red oak, 10% ash in the years 2020, 2021 and 2022, each year the crop completely dried out.

For this reason, studies were made on the climatology, the relief conditions and the limiting factors that affected the stands in the area, in order to better understand the processes that lead to the drying of the plantations.

Also, according to these studies, the premises can be created for the adoption of forest crops that can enhance even the worst vegetation conditions, by adapting the afforestation compositions according to the new climate models, the new conditions that lead to the attack of some diseases and some pests.

These studies will continue and be updated over several years, with some on soils and their influencing factors in order to create more stable afforestation compositions that can more easily overcome the actions of biotic and abiotic factors.

Until the finalization of the studies, only the conditions of favorability were established for the main species, namely oak, cer, ash, and the main recommended technical measures by applying some treatments in the borders of the neighboring groves in order to limit the spread of diseases and pests that, in the future, could cause damage to the seedlings in the new crops that will be established.

5. ACKNOWLEDGEMENTS

This work was financed from projects PN 23090102, Contract 3865/2023 and Cresforlife Contract 9/2019 within ”Marin Drăcea” National Institute for Research and Development in Forestry.

6. REFERENCES

Badea L., Bugă D., Cioflică G., Cucu V., Donisă I., Gâștescu P., Iordan I., Morariu T., Niculescu G., Oancea D., Pișota I., Posea G., Savu A., Sencu V., Șandru I., Velcea V. (1983). Geografia României I Geografia Fizică [Geography of Romania I Physical Geography], vol. I, București, Editura Academiei Republicii Socialiste România, 1-300.

Bănărescu P., Borza A., Bușniță T., Gherasimov P. I., Herbst C., Ianițki N.F. (1960). Monografia geografică a Republicii Populare Romîne. Vol 1, Geografia fizică [Geographical monograph of the Romanian People's Republic. Vol 1, Physical Geography], București, Editura Academiei Republicii Populare Romîne.

Capstick, L., Sage, R.B. & Hoodless, A.N. (2019). Ground flora recovery in disused pheasant pens is limited and affected by pheasant release density. Biological Conservation, 231, 181-188.

Climatological atlas of the Socialist Republic of Romania, (1966). Meteorological Institute

Gheța, M., Maftei, M., Bordei, I., Nicolae, C. G. (2020). Study regarding the different rearing systems for pheasant. Scientific Papers: Series D, Animal Science-The International Session of Scientific Communications of the Faculty of Animal Science, 63(2).

Madden J.R. & Sage, R.B. (2020). Ecological Consequences of Gamebird Releasing and Management on Lowland Shoots in England: A Review by Rapid Evidence Assessment for Natural England and the British Association of Shooting and Conservation. Natural England Evidence Review NEER016. Peterborough: Natural England

Moldovan, M., Constandache, C., Șimonca, V., Tăut, I., & Dîrja, M. (2020). Using Modern Technologies to Complement the Classic Ones in Soil Survey. Bulletin UASVM Horticulture, 77, 1.

Neblea, M.A., Ciobanu, R., Marian, M.C. (2020). Some Considerations Regarding The Natural Habitats From Pesceana Forest (ROMANIA). Current Trends in Natural Sciences, 9(18), 139-148. https://doi.org/10.47068/ctns.2020.v9i18.019

Tăut, I., Moldovan, M. C., Simonca, V., Colișar, A., Boca, L. C., & Lungu, T. I. (2018). Control of pathogens and pests from stands located in degraded lands in north west of Romania. Current Trends in Natural Sciences Vol, 7(14), 22-27.

Wang, L., Pedersen, P.B.M. & Svenning, JC. (2023). Rewilding abandoned farmland has greater sustainability benefits than afforestation. npj biodivers 2, 5 https://doi.org/10.1038/s44185-022-00009-9

*Corresponding author, E-mail address: cicon66@yahoo.com