

Mixed forests plantations with naturalized broadleaves and nitrogen fixing species



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Introduction

Over the last three decades there is a renewed and growing interest in the mixed plantations and, when site conditions allow, in the gradual change from pure to mixed stands. To these stands are attributed valuable functions because they are much more natural, sustainable and stable, with a big diversity and they improve the landscape aesthetics.

The aim is to study the possible benefits among the production of the main species, when in the presence of N-fixing species.

Material and Methods

Two experimental trials of mixed plantations were established in the Northeast of Portugal, in 1998. Each essay is composed by principal broadleaves species to produce high quality timber. These species are mixed with secondary N-fixing trees. One trial is composed by the species: *Prunus avium*, *Juglans nigra* and *Fraxinus excelsior*, in association with *Alnus cordata*. Thirty six plots concerning twelve different treatments with three replications were established (T1 – Pure of *Alnus cordata*; T2 – Pure of *Fraxinus excelsior*; T3 – Pure of *Juglans nigra*; T4 – Pure of *Prunus avium*; T5 – 1 line of *Juglans nigra* x 1 line of *Prunus avium*; T6 - 1 line of *Fraxinus excelsior* x 1 line of *Alnus cordata*; T7 – 1 line of *Juglans nigra* x 1 line of *Alnus cordata*; T8 – 1 line of *Prunus avium* x 1 line of *Alnus cordata*; T9 – intimate mixture of *Fraxinus excelsior* and *Alnus cordata* in the line; T10 – intimate mixture of *Juglans nigra* and *Alnus cordata* in the line; T11 – intimate mixture of *Prunus avium* and *Alnus cordata* in the line; T12 – line of *Juglans nigra* and *Alnus cordata* x line of *Alnus cordata* and *Prunus*



Mixture of *Prunus* and *Alnus*



The other trial was established with the principal species: *Prunus avium*, *Quercus rubra* and *Castanea sativa* in association with *Robinia pseudoacacia*. The treatments are: T1 – Pure of *Castanea sativa*; T2 – Pure of *Prunus avium*; T3 – Pure of *Quercus rubra*; T4 – Pure of *Robinia pseudoacacia*; T5 – 1 line of *Castanea sativa* x 1 line of *Robinia pseudoacacia*; T6 – 1 line of *Prunus avium* x 1 line of *Robinia pseudoacacia*; T7 – 1 line of *Quercus rubra* x 1 line of *Robinia pseudoacacia*; T8 – intimate mixture of *Castanea sativa* and *Robinia pseudoacacia* in the line; T9 – intimate mixture of *Prunus avium* and *Robinia pseudoacacia* in the line; T10 – intimate mixture of *Quercus rubra* and *Robinia pseudoacacia* in the line.



Mixture of *Quercus* and *Robinia*



Mixture of valuable broadleaves with *Robinia*

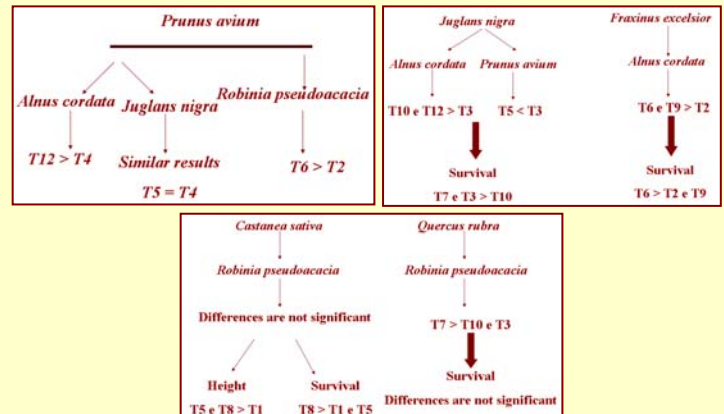


Soil incubation

Following the methodology of Raison *et al.* (1987), soil incubation was performed *in situ*, in order to evaluate the possible profits of nitrogen on the soil, and also its effects in the principal species

Results

✓The following diagrams show the performance of the principal species *P. avium*, *J. nigra*, *F. excelsior*, *C. sativa* and *Q. rubra*, mixed with *A. cordata* and *R. pseudoacacia* in the treatments where significant differences were detected.



The availability of nitrogen, measured for the amount of $N-NH_4^+$ and $N-NO_3^-$, doesn't show significant differences throughout the period of study and among the plots in analysis.

Conclusions

✓The results show that the principal species grow better in height and diameter when associated with the N-fixing species, comparatively with the respective monocultures .

✓The results obtained with respect to the N mineralization still are not consistent, due to the fact that we are dealing with very young mixed plantations and because the data collected refers to a period that was relatively short and particularly dry.

This study deals with very young mixed plantations which can be researched for a long period.

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