

Plastic mulching: a cost-effective technique for enhancing early growth on valuable broadleaves plantations in Mediterranean conditions of NE Spain



Jaime COELLO, Míriam PIQUÉ

Sustainable Forest Management Unit (AGS). Forest Sciences Centre of Catalonia (CTFC).
Ctra. vella de Sant Llorenç de Morunys, km. 2. 25280 Solsona (Spain).

jaime.coello@ctfc.es

Introduction - main features of working area (central Catalonia)

- Climate: annual precipitation around 600 - 700 mm (dry summer) / Mean annual temperature: 10 - 13°C
- Soil: generally basic (pH: 7.5 - 8.3)
- Relief: hilly; ranging between 600 - 1000 m a.s.l
- Forests: the most common land use (>70%), conifer-dominated, modeled by forest fires
- Current main problem: low profitability of agricultural and forest uses (small fields, low timber price)
 - as a result: land abandonment → colonization by high density conifers → loss of landscape and biological diversity + forest fires
 - an alternative: valuable broadleaves plantations with minimal management effort, especially interesting on small sites of top quality



Objective

The use of techniques oriented to improve the water status of plants during their first years of growth could significantly increase the success of the valuable broadleaves plantations. This improvement can be achieved directly (increased volume of water on the soil) or indirectly (reduced competence by weeds). With this regard, the use of mulching is viewed as an interesting technique.

In this study we evaluated the effect of a plastic mulching treatment on the early-growth of different valuable broadleaves plantations.

Methodology

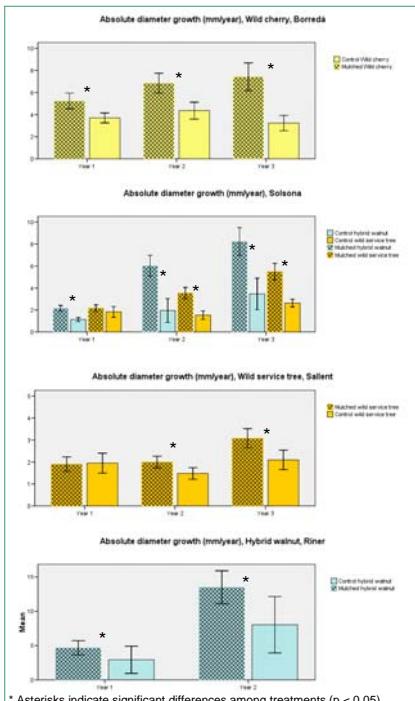
We performed 4 experimental field trials in order to study the effect of plastic mulch on early growth of different valuable broadleaved species: wild cherry (*Prunus avium*), hybrid walnut (*Juglans x intermedia*) and wild service tree (*Sorbus torminalis*).

With a design on complete random blocks, we compared the growth of these species with 2 treatments:

- Black polyethylene mulch, 80 µ thick, UV-treated, 1 m², micro-pierced, with perimeter buried
- Control (no weeding)

| Trial name | Borrerà | Solsona | Sallent | Riner |
|--|--|--|--|---|
| Plantation year (spring) | 2003 | 2008 | 2008 | 2009 |
| Altitude / Precipitation / Annual mean temperature | 1000 m / 950 mm / 9.5°C | 675 m / 700 mm / 12.0°C | 325 m / 625 mm / 13.5°C | 750 m / 650 mm / 11.5°C |
| Soil features | Loamy texture; pH 8.2 Organic matter: 3.24% | Loamy texture; pH 8.2 Organic matter: 2.44% | Loamy texture; pH 8.3 Organic matter: 1.33% | Loamy texture; pH 8.15 Organic matter: 2.29% |
| Species | Wild cherry | Hybrid walnut Wild service tree | Wild service tree | Hybrid walnut |
| # experimental trees | 96 | 128 per species | 96 | 24 |
| # years of data collection | 3 | 3 | 3 | 2 |
| Picture | | | | |

Results



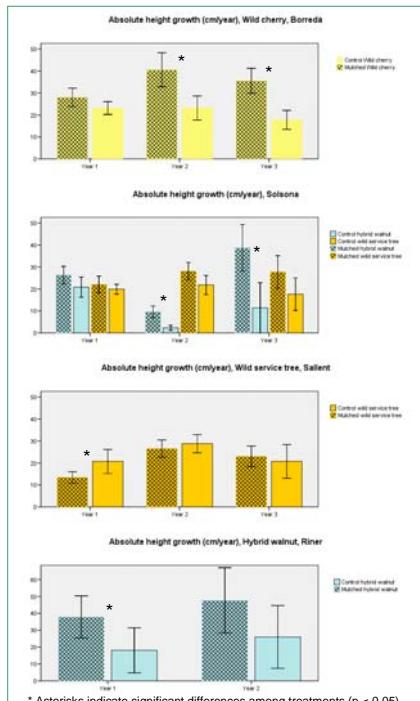
Mulch has a predominantly positive effect on tree growth.

Considering wild cherry, the relative gain in diameter growth due to mulch amounted +72%, while height growth was increased by +63%.

Hybrid walnut response was quite positive to mulch, too, notably in Solsona, where gains amounted +203% in diameter growth, and +97% in height growth. In Riner trial, with only 2 vegetative periods, the growth gains due to mulch were +73% and +71%, respectively.

In the case of wild service tree the effect of mulching was not constant among the trials: while in Solsona trial the gains were remarkable (+139% in diameter growth, +68% in height growth), in Sallent trial the effect was not so evident (+33% and -1%, respectively).

In all cases where mulch had a positive effect, the gains were increasingly evident over time, especially regarding diameter growth.



Discussion and conclusions

- The use of polyethylene mulching seems to be a cost-effective technique for enhancing survival and early-growth of young valuable broadleaved plantations in Mediterranean areas.
- This treatment was particularly effective with water-demanding species: growth gains in wild cherry and hybrid walnut (exigent species regarding water availability) were more evident than in wild service tree (a drought-tolerant species).
- The development and evaluation of environmentally friendly mulching materials (e.g. biodegradable) might be an interesting alternative to the use of plastics.

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