Forest nursery plant Exterior Quality Targets by optimization of frost resistance and root growth potential

Francisco J. Lario Leza — *TRAGSA- Dpto. Mejora Agroforestal*
flario@tragsa.es — *Ctra. Maceda-Valdrey km 2; 32700 Maceda-Ourense-SPAIN*

Project cofinanced by INTERREG IIIB SUDOE

Presented in Forexpo 2008

Forest nursery plant production quality control is the key factor to get the most out of Forest Reproductive Material's genetic potential. This work shows a methodology for obtaining practical dry biomass reference values based on physiological plant attributes (frost sensitivity of roots and leaves, and root growth potential) for quality plant certification.

PRODUCT STANDARD

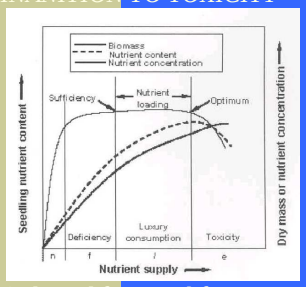
Pinus pinaster Ait.
Spanish provenance region: Noroeste Litoral 1.a

TRADITIONAL CUMULATIVE NITROGEN SUPPLYING TARGET OF 70 mg per seedling FOR FIXED PRODUCTION PARAMETERS:

- Northwestern Spain nursery location
- Nursery culture cycle of 16 weeks (from middle June to November)
- Germination period under greenhouse (3 weeks). Growing and hardiness period outdoor without shadow (13 weeks)
- Continental climate
- Containerized in 200 cc with 80-20 peat-vermiculite substrate
- Fertirrigation strategy: by sparkling when needed, low quantity and high watering frequency
- Fertilization balance (N-P-K):
  - 150 60 150 (ppm growing period fertilizer)
  - 50 60 150 (ppm hardiness period fertilizer)

METHOD

1 *TESTING TARGETS FROM INANITION TO TOXICITY*



(Adapted from Salifu & Timmer 2003)

2 *ASSISTED BY AN ADAPTED TO TRIALS FLOODING FERTIRRIGATION SYSTEM*

3 *CUMULATIVE NITROGEN SUPPLY TARGETS MATCHED IN 2007*

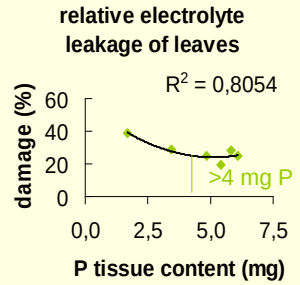
4 *PLANT ANALYSIS*

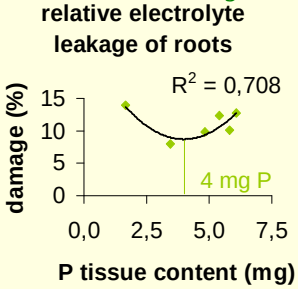
- *NUTRIENT TISSUE CONTENT and DRY BIOMASS*
- *PLANT FREEZE TEST (a. f. Royo et al. 2003)*
- *ROOT GROWTH POTENTIAL (a. f. Ritchie 1985)*

QUALITY RESULTS

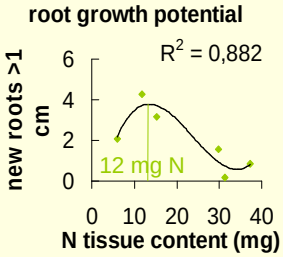
CELLS FROST RESISTANCE AND ROOT GROWTH POTENTIAL IS HIGHLY RELATED TO SEEDLING NUTRIENT CONTENT

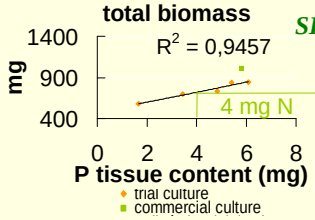
OPTIMUM P CONTENT ON FROST RESISTANCE OF ROOTS AND LEAVES BASES IS REACHED AT 4 mg/seedling





OPTIMUN N CONTENT FOR MAXIMIZING ROOT ESTABLISHMENT IS REACHED AT 12 mg/seedling

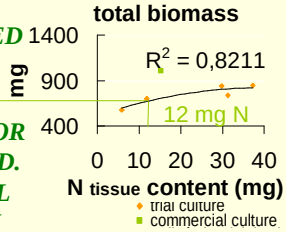




SINCE NUTRIENT CONTENT IS HIGHLY RELATED TO TOTAL BIOMASS PER SEEDLING ...

700 mg

....WE FOUND THE TARGET DRY BIOMASS FOR THE TRADITIONAL PRODUCTION STANDARD. THIS CAN BE USED TO CERTIFY THE REAL QUALITY OF EACH FUTURE PRODUCTION



CONCLUSION

Salifu, K. F., and Timmer, V. R. 2003. Optimizing nitrogen loading of Picea mariana seedlings during nursery culture. Can. J. For. Res. 33:1287-1294; Ritchie, G. A.1985. Root growth potential: principles, procedures and predictive ability. October 16-18, 1984. Forest Research Laboratory, Oregon State University; Royo, A., Fernández, M., Gil, L., Pardos, J. A. 2003. Assessing the hardiness of Aleppo pine, miritime pine, and holm oak seedling by electrolyte leakage and water potential methods. Tree Planter's Notes 50: 38-43

This work was done thanks to ***Blanca López (Tragsa), Agustín Merino (USC), Juan Antonio Gómez (Tragsa), Personal de vivero, campo y laboratorio del Vivero de Maceda de Tragsa, Departamento Mejora Agroforestal de Tragsa, y Subdirección de I+D+i de Tragsa***