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# Development and allocation of improved eucalyptus for biotic an abiotic tolerance

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Since the 1960s, Altri Florestal is running a programme for selecting trees based on growth, wood density and cellulose content. Currently *Eucalyptus globulus* breeding programme is in third generation. Capturing the genetic gain is conducted through vegetative propagation to produce clones, as well as through seed production from a mass-controlled pollination programme for full-sib families. Ongoing climate change raises the importance of considering tolerance to abiotic stress in the *Eucalyptus globulus* breeding programme. Pursuing this objective has been done by carrying out a Best Linear Unbiased Prediction (BLUP) analysis considering macro climate regions with different exposure to cold and drought. Cold and drought maps were combined in one resulting in four regions of exposure: drought region (R1); cold region (R2); cold and drought region (R3); region with low exposure to cold and drought (R4). BLUP analysis included data from eighty-four field breeding trials with the following climatic distribution: 30 (R1); 19 (R2); 4 (R3), and 31 (R4). Data used comprises 160k genotypes and 210k measurements of height, diameter at breast height, and survival. It was possible to select around four genotypes with an overall superior performance in terms of growth and survival for the four regions considered. Furthermore, within each macro climate region groups of genotypes were selected with an increase of 50% volume per hectare above the original eucalyptus in the breeding programme. Altri is also involved in the development of new eucalyptus hybrids aiming to develop a new generation of eucalyptus hybrids more resilient to drought and cold, as well as pests such as *Gonipterus platensis*. This ongoing work is carried out via interspecific hybridization between *E. globulus* and other eucalyptus species. Eucalyptus hybrids are in several stages of development, namely: tested in several field trials, early field selection, being raised in the nursery, and being done through controlled crosses. Selection criteria will be based on performance from growth, survival, wood characteristics in field trials and in trials in controlled conditions. Finally, it is not enough to develop a portfolio of improved eucalyptus to ensure that realised genetic gain will be captured into operations. For this to happen it is necessary to ensure that allocation of improved eucalyptus is carefully planned. A prototype of decision tree for deploying improved eucalyptus has been already developed.

**Keywords**: Eucalyptus globulus, eucalyptus hybrids, tree improvement, forest breeding



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