

QUANTIFICATION OF NITROGEN FIXATION BY TREES
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SUMMARY

Serious attempts to improve upon the proportion of amount of nitrogen that trees derive from biological nitrogen fixation require suitable methodologies to measure nitrogen fixed. Since such trees are also capable of deriving part or even all of their nitrogen for growth from soil or fertilizer nitrogen, the chosen methods should be able to quantify or assess nitrogen derived from fixation, distinct from soil or fertilizer-derived nitrogen. In addition, these techniques should be applicable directly in the field, and should give integrated estimates of nitrogen fixed.

The N-15 isotope dilution techniques which involve the incorporation of N-15 enriched nitrogenous fertilizers into soil have proved to be useful in quantifying nitrogen fixed in many forage legumes, grain legumes, and more recently leguminous and non-leguminous trees.

The advantages of these N-15 methods include field-applicability, ability to distinguish between different nitrogen sources, integrated estimates up to desired periods, ability to isolate treatment effects on dry matter and total nitrogen yield from nitrogen fixing potential. Besides, it is possible to derive other useful agronomical information in addition to nitrogen fixed from such N-15 aided studies.

Much of the criticism against the N-15 isotope dilution techniques arise from either ignorance and unfounded fear, misconceptions and practical problems that have nothing to do with these methods per se, e.g. the massive sizes of many trees and the problems they pose with experimental plot sizes and sampling. Indeed, through judicious planning, it is possible to conduct not too expensive N-15 aided studies that should be the basis for much of the desired improvements in nitrogen fixation in trees.