Can biologicals add value to forestry?

An article by Andermatt Madumbi

With chemical pesticides under the microscope from legislators and a changing global consumer landscape, the South African agriculture industry has embraced biological solutions in order to remain a player on the global export market.

While for many, the change to an Integrated Pest Management (IPM) program has been forced by MRL restrictions (Maximum Residue Limits; limiting the use of conventional chemical pesticides) in global markets – early adopters of biological crop management and pest control solutions have noted improvements in both crop health and total yield.

Farmers who were quick to spot the need to move to a biological approach have benefitted – both in terms of being able to place their products on supermarket shelves overseas before their competitors; as well as the many advantages that a healthier, more sustainable approach to farming provide.

The question remains, can biological solutions provide real value in forestry?

Andermatt Madumbi, South African market leaders in biological solutions – based in KwaZulu-Natal, have been driving the implementation of biological solutions in the agriculture industry for two decades – and have begun trialling the use of their solutions in the South African forestry sector.

With the understanding that paying particular attention to plant health in the nursery can transfer to better early tree growth, Andermatt Madumbi has undertaken to provide foresters with healthy seedlings that survive early planting stress (less mortality) and grow quickly to reduce early weeding costs.

Part of a global group, Andermatt Madumbi has taken inspiration from success stories in other countries such as Canada, where a biological approach to the forestry sector has paid dividends.

A South African case study

With pressure on the South African forestry sector to undergo change, and the deregistration of a number of chemical applications; Roger Poole, Chairman of the Timber Industry Pesticide Working Group and Andermatt Madumbi set about looking for alternatives at a nursery level to trial the efficacy of biologicals.

The Andermatt Madumbi team, spearheaded by biospecialist Mark Hutton and Andrew Tedder, a consultant with forestry experience; visited a KZN forestry nursery to get an overview of the facility, and understand the concerns experienced in this high-pressure environment

– where approximately 17 million seedlings are grown annually.

Nursery diseases such as Powdery mildew and those caused by *Quambalaria eucalypti, Calonectria, Fusarium* and *Botrytis* species thrive in artificial environments such as forestry greenhouses; and can cause severe foliar and shoot disease, negatively impacting the rooting and survival of cuttings.

The root cause

To determine whether biological products could play a role in reducing the impact of nursery diseases, a trial programme was set in motion.

Andermatt Madumbi's root health program was trialled, with a view of creating healthy "parent" stock for cuttings that could resist pathogens better and transfer to healthier, hardier cuttings that would fare better against potential disease. A set of criteria was developed to identify the success of the program, with disease scoring; number of suitable cuttings for setting; rooting and survival scoring in rooting camps; and rooting quality, survival and seedling quality in growing camps, all used to ascertain the success or failure of the trial.

The trial started in August 2021, and the full root health program included:

i. Eco-T®, which contains *Trichoderma asperellum* to suppress fungal soil pathogens and colonises roots to form a protective barrier.

ii. RhizoVital® 42, a biofertiliser that contains *Bacillus amyloliquefaciens*, which grows on roots, supporting healthy root growth and improved soil nutrient availability.

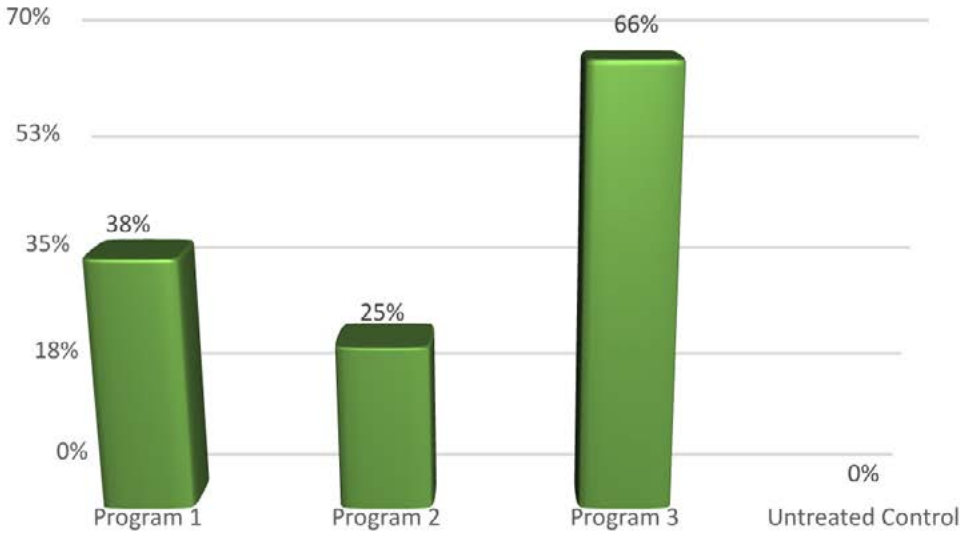
iii. V12 Initiate, a supplement for early growth phases – supporting cell strength and initiating the plant nutrition cycle.

iv. AgriSil K50®, which supports natural plant immunity, vascular function, and increases stress tolerances.

To fully understand the effect of the root health program on cuttings, the program was applied at three different dose rates. The products in the first root health program were applied at half of the registered dose rates, products in the second root health program were applied at the registered dose rates and products in the third root health program were applied at double the registered dose rates. The root health programs were compared to untreated hedges representing the standard program.

Parent hedges showed an increase in health and vigour within three weeks and this could be seen in the number of cuttings harvested (graph 1). The remarkable increase (25 to 66%) in number of cuttings at harvest have a significant impact on the plant production capacity.

In both the rooting and growing camps, treated cuttings showed good vigour and strong survival. Rooting improved across the three root health programs when compared to the nursery standard program (Figure 1 and 2).



Graph 1. The percentage increase in the number of cuttings per parent hedge achieved using the three root health programs are compared to the nursery's standard program in the graph above. Treatment with the root health programs lead to an increase of 25 to 66% in the average number of cuttings harvested in the period between September 2021 to January 2022. This is a significant increase in plant material. The root health program applied at double the registered dose rates (Program 3) had no detrimental effect on hedge growth, but rather drastically increased the number of cuttings harvested from each hedge.

The biological advantage

A powdery mildew outbreak in September was significant but was brought under control after an initial application of BioCarb-K (showing promise to suppress some foliar pathogens and is currently in the process of being registered as a mineral fungicide), and subsequent treatments as outlined in the initial programme.

At the height of the *Quamabalaria* season, the program was heavily impacted by disease, with a high mortality noted in the growing camp – but the biological trial fared better than the controls during this time.

Lessons learned and the way forward

The positive results showcased in the root health trial highlight the role that biological solutions can play in the forestry sector. As the industry looks forward to a more ecologically-conscious future, biologicals can make an impact.

With growing demand for FSC (Forest Stewardship Council) certification, and the demand from consumers who want to know that their product has been grown in a sustainable, eco-friendly manner – biological solutions will become increasingly important.

That being said, beneficial chemical solutions still play an important role in preventing the damage caused by nursery diseases and the best route forward may be an integrated approach; where biologicals work hand-in-hand with existing program to improve efficiencies across the board.

'We are encouraged by the early positive results achieved in the forestry nursery environment and will continue to build on this foundation. We look forward to adding value to the forestry industry with quality, effective biological solutions that are 'Backed by Science and Loved by Nature' – Mark Hutton, Andermatt Madumbi biospecialist. With increasing pressure on those in the forestry sector to think outside the box for a better future, biologicals are a logical first step on the path to sustainable growth.

To find out more about Andermatt Madumbi and their range of products, visit www.andermatt.co.za.

Figure 1: Root growth from the standard nursery program cutting 6 weeks after setting.

Figure 2: Root growth from the root health program 4 weeks after setting. Root health programme resulted in cuttings with stronger and vigorous root growth.

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