



BREAKTHROUGH TECHNOLOGY
BIRD DETERRENT GRASSES

AIRPORTS



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AVANEX® unique endophyte technology includes two novel endophytes; AR601 and AR95.

PGG Wrightson Turf, AgResearch, the Foundation for Arable Research (FAR) and Grasslanz have developed AVANEX® unique endophyte technology. This exciting new innovation has been included in turf-type grasses; Jackal, a tall fescue, and Colosseum, a perennial ryegrass. These endophytes can produce high quantities of alkaloids that can reduce a number of insect pests while also being a deterrent to wildlife grazing. AVANEX® unique endophyte technology in turfgrasses provides tough, wear resistant cultivars that can stand up to aircraft movement, jet blasting and braking.



"The birds learn to avoid the area"
Chris Pennell, AgResearch

WHAT IS ENDOPHYTE?

Endophyte is a natural fungus found in many ryegrasses and tall fescue species. The fungal strands grow between the plant cells, and transmit themselves to the next grass generation by growing into the developing seed and into the subsequent grass seedling.

Wild type endophytic fungi (*Neotyphodium* sp.) co-evolved with grasses and are known to protect plants from overgrazing by animals and insect predation by the production of toxins. For airports and recreational areas turfgrasses were inoculated with novel endophytes that produce insect and animal/bird avoidance behaviour. Bird strikes mostly occur during the take-off and landing phases, so a grass that reduces the attractiveness of airports and their surrounding areas to bird activity by habitat modification could be an important part of an airport's long term solution.

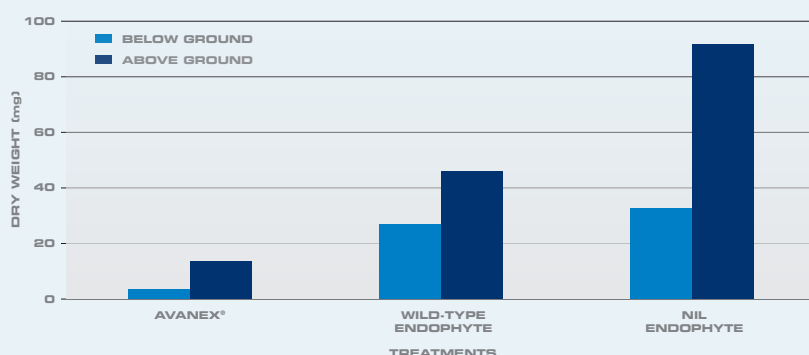
AVANEX® UNIQUE ENDOPHYTE TECHNOLOGY: A POTENTIAL TOOL FOR AIRPORTS

AVANEX® unique endophyte technology may assist in reducing the number of birds on or near airfields. The alkaloids produced by the endophytes not only reduces the number of insects but can also reduce feeding of a number of bird species, including finches, gulls and wild Canada geese.

AVANEX® unique endophyte technology has been shown in trials to reduce insect numbers and as a result the area is less attractive to insect feeding birds. Figure 1 shows a significant reduction in insect numbers on the AVANEX® cultivars compared to grasses with wild type endophyte and grasses with no endophyte.

AVANEX® unique endophyte technology has also been shown to reduce bird populations through post digestion feedback. This is where birds that feed directly on the grass feel ill after feeding and learn to avoid the area.

FIGURE 1: AVERAGE DRY WEIGHT OF INSECTS OVER THREE SEASONS 2010-11



SUCCESS WITH AVANEX®

Christchurch International Airport has been extremely pleased with the results of AVANEX® Jackal on our airfield. Right from the start some 12 years ago, Christchurch International Airport understood the benefits of the development of such a product and hence the large investment we have put into this project. While potential birdstrikes are an issue for the aviation industry across the globe, using this grass and creating a less attractive and palatable environment around airports is a significant move to reducing that risk.

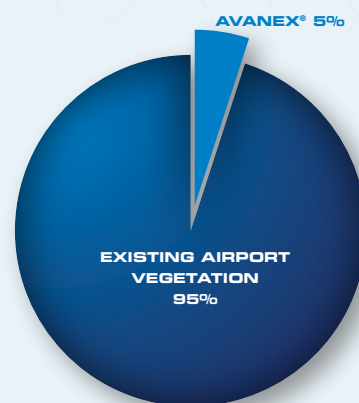
Andy Lester, Christchurch Airport
Chief Operating Officer



CHRISTCHURCH INTERNATIONAL AIRPORT

- Significant reduction in the number of birds on the AVANEX® Jackal (5%) compared to the existing airport vegetation (95%).
- For every bird on the AVANEX® Jackal plots there were 19 times more birds on the existing airport vegetation.
- Canada geese and other bird species have shown a significant avoidance of AVANEX® Jackal trial plots.
- Selected AVANEX® Jackal plots had less insects compared to either nil endophyte or wild type plots.

12 MONTH BIRD DISTRIBUTION
AT CHRISTCHURCH AIRPORT

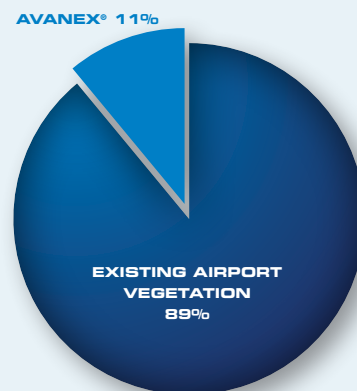


SOWN IN 2009.
TOTAL MEASURABLE AREA IS
111 ACRES (45 HECTARES) WITH
37 ACRES IN AVANEX® JACKAL
(14 HECTARES).

HAMILTON INTERNATIONAL AIRPORT

- Significant reduction in the number of birds on the AVANEX® Jackal (11%) compared to the existing airport vegetation (89%).
- For every bird on the AVANEX® Jackal plots there were 8 times more birds on the existing airport vegetation.
- Canada geese and other bird species have shown a significant avoidance of AVANEX® Jackal trial plots.
- Selected AVANEX® Jackal plots had less insects compared to either nil endophyte or wild type plots.

12 MONTH BIRD DISTRIBUTION
AT HAMILTON AIRPORT



SOWN IN 2010.
TOTAL MEASURABLE AREA IS
75 ACRES (30 HECTARES) WITH
25 ACRES IN AVANEX® JACKAL
(10 HECTARES).



FEATURES OF AVANEX® UNIQUE ENDOPHYTE TECHNOLOGY

- **Contains novel endophyte, a naturally occurring fungus**
- **Produces high levels of alkaloids**
- **Available in tall fescue and perennial ryegrass cultivars**

BENEFITS OF USING AVANEX® UNIQUE ENDOPHYTE TECHNOLOGY

- **Can reduce insect populations and resident bird populations**
- **Is cost effective and can save you money in the long term**

INTELLECTUAL PROPERTY PROTECTION

AR601 endophyte is protected by New Zealand Patent Application 579801, USA Patent Application 8101400, Australia Patent pending 2008 244736, Europe Patent pending 08753855, Argentina Patent pending 8010793 and Uruguay Patent pending 31.054. Harvesting/propagating, re-sowing, and/or on-selling AR601 seed may infringe these patents and may result in prosecution. The AR601 endophyte is protected under the New Zealand Plant Variety Rights Act 1987 and Australian Plant Breeder's Rights Act 1994.

AR94 endophyte is protected by New Zealand Patent pending 579801, Australia Patent pending 2008244736, USA Patent pending 13/308939, Uruguay Patent pending 31.054, Argentina Patent pending 08010793, and European Patent Pending 08753855.9. Harvesting/propagating, re-sowing, and/or on-selling AR94 seed may infringe these patents and may result in prosecution.

AR95 endophyte is protected by New Zealand Plant Variety Rights Act 1987, Australian Plant Breeders Rights Act 1994, and European Plant Variety Rights Application 2011/2143.

AVANEX® is a registered trademark of PGG Wrightson Seeds Limited in New Zealand, Australia, United States of America and the European Community.

Grasslanz is a registered trademark of Grasslanz Technology in New Zealand and Australia.

WARNING: THIS GRASS VARIETY CONTAINS A NOVEL ENDOPHYTE. INGESTION OF THE SEED OR THE GRASS CAN CAUSE SEVERE ADVERSE ANIMAL HEALTH ISSUES AND IS NOT TO BE USED AS FEED FOR ANIMALS AND BIRDS. IN SEVERE SITUATIONS IT MAY CAUSE DEATH TO GRAZING ANIMALS.

DISCLAIMER

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