



THIS IS JUST THE BEGINNING

The 40 specific bacteria and fungi added to formulate the current **POPUL8™** product have been selected from a collection of some 500+ specific function bacteria and fungi that Neutrog's R&D team, headed by Dr Uwe Stroehler, have extracted from a vast number of soil samples from around Australia.

It is Neutrog's core philosophy that it is not just about finding and including a single bacteria or fungi that is the best performer of a specific function, but rather to gather a diversity of those microbes that best carry out the specific function in a variety of soil conditions. This approach provides the optimum opportunity for the microbes in **POPUL8™** to proliferate and perform, no matter what the geographical area or soil conditions.

Hence as new specific function microbes are discovered, they will be assessed against those existing within **POPUL8™** and if they are either better performers or from a wider variety of soil conditions, they will either become an additional microbe or they will replace an existing one.

Furthermore, as our research expands, there is significant potential to expand the functionality of **POPUL8™** to include microbes that increase Abiotic (Drought) stress tolerance and others that will reduce, if not remove, salinity stress.

TABLES

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POPUL8™



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ABOUT DR UWE STROEHER

Dr Uwe Stroehler graduated from the University of Adelaide in 1993 with a Ph.D in Microbiology, where he remained for a further six years working as a research scientist on aspects of cholera. In 1998 he was awarded the prestigious Alexander von Humboldt Research Fellowship and subsequently spent over two years working in Tuebingen, Germany.

On his return to the University of Adelaide in 2001, he worked on *Streptococcus pneumoniae* for eight years before moving to the Hepatitis Research Laboratory.

In 2010 Dr Stroehler, moved to Flinders University to work on the super bug, *Acinetobacter baumannii* which can cause pneumonia and meningitis. Whilst at Flinders University he also worked on the use of clean technology to enhance chemical compounds.

During his research career Dr Stroehler published over 40 peer reviewed journal articles and two book chapters.

Over the last 25 years Dr Stroehler has had a keen interest in soil microbiology and in bioremediation and hence when he was approached by Neutrog some 17 years ago he jumped at the chance to consult to the company in the development of GOGO Juice and then Litterbugs (to be marketed and sold under the product name **LITTERM8**) - an ammonia liberating biological for use in commercial animal bedding (chooks, pigs etc) and with some domestic application in cat litters.

Six years ago, Dr Stroehler joined Neutrog full time to head up its R&D program.



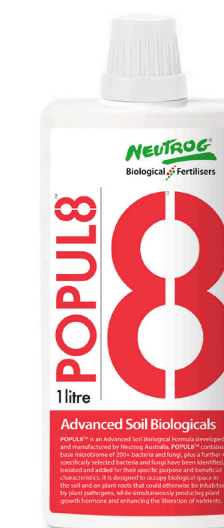
POPUL8™



“ **THE WIDE DIVERSITY of bacteria and fungi within POPUL8™ are not only CAPABLE OF PREVENTING, INHIBITING AND SUPPRESSING disease-causing plant and soil pathogens, but at the same time are STIMULATING AND ENHANCING HEALTHY PLANT GROWTH, both above and below ground.** ”

Dr Uwe Stroehler

R&D Manager,
Neutrog Biological Fertilisers



POPUL8™ is an Advanced Soil Biological Formula developed and manufactured by Neutrog.

POPUL8™ is designed to not only enhance plant growth and nutrient cycling but to also populate and occupy the biological space in the soil and on plant roots which may otherwise be an available space for plant pathogens to inhabit... Hence its name POPUL8™

POPUL8™ contains a diverse base microbiome of some 200+ bacteria and fungi, plus a further 40 specifically selected bacteria and fungi have been identified, isolated and added for their specific purpose and beneficial characteristics.

The high number and wide diversity of specific purpose bacteria and fungi (microbes) have been added to maximize the range of functions the biologicals within POPUL8™ are capable of performing, including:

- 1 **Nutrient Liberation** of nutrients such as Phosphorus, Potassium and Calcium from adding microbes such as **Bacillus, Penicillium and Serratia**
- 2 **Plant Pathogen Inhibition and Suppression** (of pathogens such as Fusarium, Rhizoctonia and Phytophthora) through the addition of microbes such as **Penicillium and Trichoderma**
- 3 **Plant Growth Hormones** such as auxins and gibberellins from adding microbes such as **Pseudomonas**
- 4 **Nitrogen Fixing** from adding microbes such as **Azotobacter** (which can fix up to 40kg of nitrogen per hectare per year)
- 5 **Nutrient Cycling**, mainly from its diverse base of 200+ microbes, mostly known for their ability to breakdown organic compounds
- 6 **Bio-Stimulation** from proteins, vitamins, amino acids, micro-nutrients, cellulose, fulvic and humic acids extracted from kelp, fish and leonardite

POPUL8™ is applied at the rate of 5 litres per hectare.

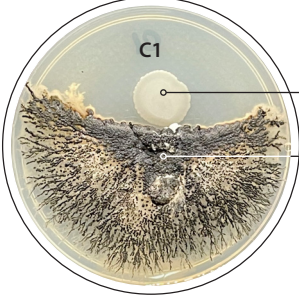
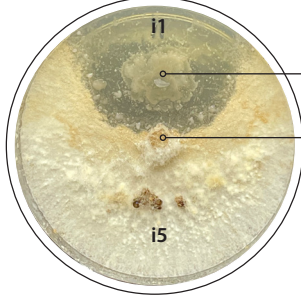
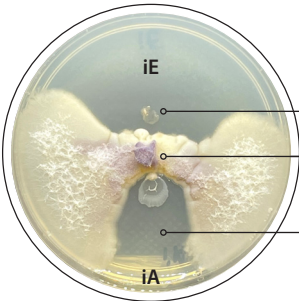
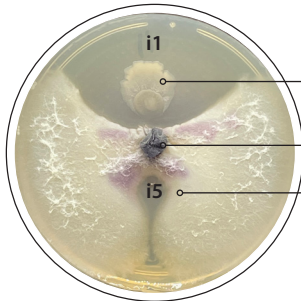
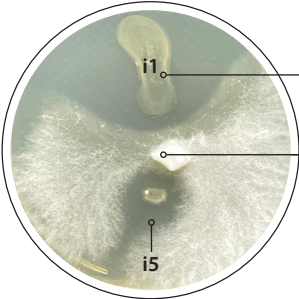
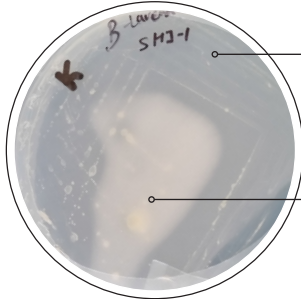


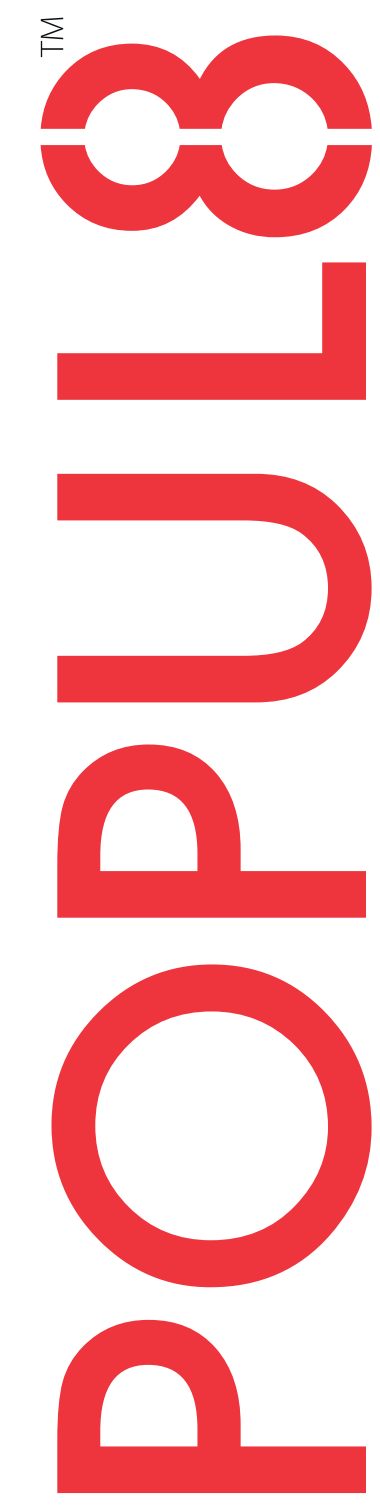
**POPUL8 LAB TESTS
INHIBITION & SOLUBILISATION**

POPUL8 contains a high number and wide diversity of specific purpose bacteria and fungi (microbes).

These microbes have been individually chosen to maximise both the range of functions they are capable of performing as well as their ability to be effective in a broad spectrum of geographical locations and soil conditions. Shown below are actual examples of the tests performed by Neutrog's laboratory that demonstrate plant pathogen inhibition and suppression along with nutrient liberation.

The bacteria in these tests are all included in POPUL8.

 <p>C1 Inhibitor Pathogen</p>	 <p>i1 Inhibitor Pathogen i5</p>
<p>Inhibition of the pathogen <i>Colletotrichum coccodes</i> (Black Dot from potato) by bacterial isolate C1 but not C2 (which has been overgrown by the pathogen)</p>	<p>Inhibition of the pathogen <i>Rhizoctonia solani</i> (isolated from tomato) by bacterial isolate i1 but not i5</p>
 <p>iE Inhibitor Pathogen Inhibitor iA</p>	 <p>i1 Inhibitor Pathogen Inhibitor i5 Partial Inhibitor</p>
<p>Inhibition of the pathogen <i>Pythium</i> (isolated from strawberries) by bacterial isolate iE and iA</p>	<p>Inhibition of the pathogen <i>Pythium</i> (isolated from strawberries) by bacterial isolate i1 and partial inhibition by i5</p>
 <p>i1 Inhibitor Pathogen i5</p>	 <p>Soluble potassium SH1/S3/18/K Insoluble potassium</p>
<p>Inhibition of the pathogen <i>Sclerotinia sclerotiorum</i> (isolated from tomato) by bacterial isolates i1 and i5</p>	<p>Liberation of <i>potassium</i> by bacterial isolate SH1/S3/18/K</p>



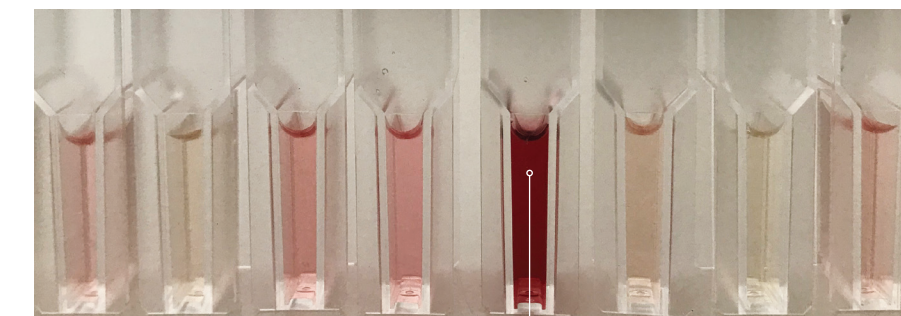
**POPUL8 LAB TESTS
AUXINS**

POPUL8 contains six individual auxin producers.

Auxins are produced both by plants and by soil bacteria. In plants, auxins are produced in both the apical tip as well as in the roots. Auxins are perhaps best known for their role in root development, but they also help in regulating the plants shape, stem elongation and their ability to bend towards the light. Auxins produced by bacteria in the soil, are valuable for their capacity to regulate bacterial growth and as a way for differing bacteria to communicate.

Plants take advantage of the auxin produced by soil bacteria to enhance their own root development, thus soil inoculants which contain auxin producing bacteria can boost and accelerate the plant root growth.

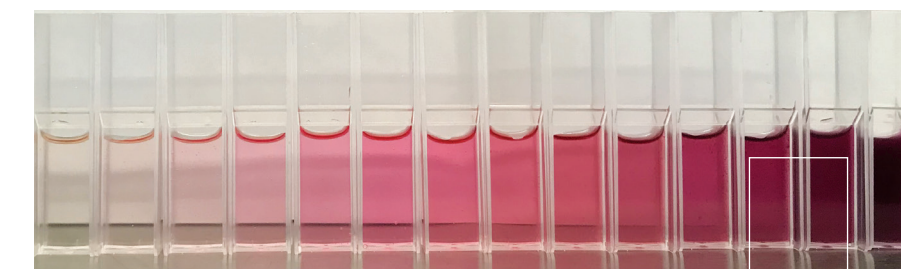
TEST RESULTS FROM BACTERIA DEMONSTRATING THEIR CAPABILITY IN PRODUCING AUXINS



TGB15

There are six auxin producers in POPUL8 including isolate TGB15 which produces approximately 130mg/l of auxin which is considerably higher than most reported auxin producing strains.

THE REFERENCE SCALE FOR TESTING AUXIN SATURATION IN TEST SAMPLES



Isolate TGB15, sits in this range for its ability to produce growth hormones.