Environmental Protection Authority
Te Mana Rauhī Taiao

EPA Discussion Document:

Release of three nitrogen fixing bacteria

For soil conditioning in agriculture

Under section 34 of the Hazardous Substances and New Organisms Act 1996

2 March 2012

Purpose of this document

1. In February 2012, an application was made to the Environmental Protection Authority (EPA) seeking to release three endophytic nitrogen-fixing bacteria that take nitrogen from the air and convert it to a form that plants can use. Endophytic bacteria have been found in almost all plant species. They colonise the internal tissues of their host plant and form a range of different symbiotic relationships. Endophytic, nitrogen-fixing-bacteria can promote plant growth and yield and can also be beneficial to their host by producing a range of natural products.

2. This discussion document is produced by the EPA to facilitate the submission making process. The document discusses information provided in the application and other readily available sources.

3. We encourage submissions, particularly in relation to matters identified in the following paragraphs. The submission period ends on Monday 16 April 2012.

Submission Process

4. In a submission you can provide information, make comments and raise issues. In this way, you contribute to the EPA decision making process on specific applications. The EPA is particularly interested in hearing from you on the following matters:

- Methodology;
- Adverse effects, especially adverse effects not identified in the application[1]; and
- Positive effects, especially positive effects not identified in the application[2].

Further information on submissions can be found at:

http://www.epa.govt.nz/about-us/have-your-say/Pages/make-submission.aspx

Application Summary

5. The applicant considers that the New Zealand agricultural and horticultural sectors rely largely on synthetic fertilisers to supply nitrogen to crops. The applicant states that the use of such fertilisers is a massive cost to these industries and is unsustainable; leading to groundwater, rivers and drinking supplies becoming degraded.

6. The applicant states that the three microorganisms named in his application; *Azorhizobium caulinodans, Azoarcus indigens* and *Azospirillum brasilense,* are used successfully in both

[1] Adverse effects can include any risks and costs associated with approving the release of these organisms.

[2] Positive effects can include any benefits associated with approving the release of these organisms.

conventional and registered organic systems around the world to reduce the levels of synthetic fertilisers used in cropping systems. The applicant asserts that research has demonstrated that these microorganisms pose no risk to the environment.

7. Please see the Application Summary and the full Application for more details.

***Background on** Azorhizobium caulinodans*

8. *Azorhizobium caulinodans* is a free-living stem- and root nodulating, nitrogen fixing bacterium that colonises grass roots, e.g. wheat.

***Background on** Azoarcus indigenes and Azospirillum brasilense*

9. These are both obligate, non-free-living endophytic nitrogen fixing bacterium that occur within the tissue of the host plant.

Adverse effects

10. The EPA is interested in understanding all the possible adverse effects associated with the release of these bacteria. These include (but are not limited to): human health, environmental, economic, social and cultural effects.

Adverse Effects assessment

11. The EPA adverse effects assessment is based on the evidence of testing provided by the applicant, and the references cited within the application. See section 6 of the application, and appendix 2 for an explanation of the testing methods and the results.

Please let us know if you can identify issues with the testing methodology or the results.

Identification of Adverse Effects

12. The applicant has identified adverse effects potentially associated with the release of these three bacteria (see pages 7-9 of the application). In particular, the EPA would like any information you have in relation to displacement of native soil microbes, as the application identifies this possibility, although testing provided by the applicant (see appendix 2) shows that native soil microbes outcompete all three of the proposed new organisms.

13. The applicant notes that in the absence of regular “top-ups”, the microorganisms are unlikely to be the predominant microorganisms present within the soil/plant microcosm unless specific conditions occur where the microorganisms have a selective advantage.

14. The EPA is interested in any information you may have on the “specific conditions” under which these bacteria may have a competitive advantage and any resulting adverse effects.

15. The EPA is also interested in any information you may have on adverse effects resulting from the displacement of native species within their native habitat, deterioration of natural habitats and maintenance of New Zealand’s inherent genetic diversity.

Please let us know whether you consider that there are additional adverse effects that we should be aware of.

When identifying adverse effects it is important that you provide us with reasons as to:

- What other adverse effects are *likely* to be caused by the release of *Azorhizobium caulinodans*, *Azoarcus indigenes* and *Azospirillum brasilense*;
- How *likely* are these adverse effects and what is their potential magnitude;
- How do you think the adverse effects could happen (i.e. the series of events that would have to happen for the adverse effects to occur);
- Options and proposals for managing the adverse effects; and
- Any uncertainty you have on the scope of the information used to assess the adverse effects.

Positive Effects

16. The EPA is interested in understanding all the possible positive effects associated with the release of *Azorhizobium caulinodans*, *Azoarcus indigenes* and *Azospirillum brasilense*.
17. The applicant claims that long term benefits will flow from the release of these microbes (see pages 7-9 and appendix 1 of the application). Please let us know whether you consider that there are additional positive effects that we should be aware of.
18. The EPA understands that beneficial plant–microbe interactions promote plant health and development, increasing yield in the production sector.
19. In addition, the EPA is interested in any information you may have on the potential of these bacteria to remove soil contaminants by enhancing phytoremediation through their potential for the enhanced biodegradation of pollutants in soil.

When identifying positive effects, it is important that you provide us with reasons as to:

- What other positive effects are *likely* to be caused by the release of *Azorhizobium caulinodans*, *Azoarcus indigenes* and *Azospirillum brasilense*;
- How *likely* are these positive effects and what is their potential magnitude;
- How do you think the positive effects could happen (i.e. the series of events that would have to happen for the positive effects to occur);
- Options and proposals for ensuring the positive effects occur; and
- Any uncertainty you have on the scope of the information used to assess the positive effects.

Making a submission

We encourage you to make a submission. When the submission period closes, all submissions will be summarised and made available to the decision making Committee. You can request a hearing if you would like to present your submission in person before the Committee.

If you have any questions, you can contact the EPA. The EPA can address any questions you have about the science of the application or the information provided, and can advise you on how to prepare your submission.

EPA contact: Kate Bromfield, email Kate.Bromfield@epa.govt.nz or phone 04 918 4848.