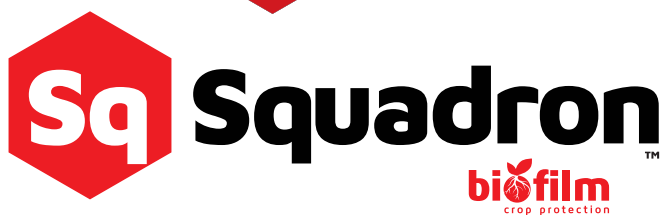


# Better biology

from **biofilm**  
crop protection

**Pseudomonas fluorescens 1 x 10<sup>8</sup> cfu/ml**



- ✓ Vegetables, Fruit, Nuts, Ornamental, Root and Tuber crops.
- ✓ Dual purpose PGPRB (Plant Growth Promoting Rhizo-Bacterium)
- ✓ Effective biological management of a broad range of plant pathogens

## Key Information

- » *Pseudomonas fluorescens* is an obligate aerobe, gram negative bacteria.
- » These bacteria are able to inhabit many environments, including: plants, soil, and water surfaces.
- » Its name comes from its production of the soluble fluorescent pigment pyoverdine. They get certain nutrients and environmental protection from the plants they reside near and in return, aid the plant in several ways
- » They also protect the plants from infection by pathogens by producing secondary metabolites
- » They also keep other pathogens at bay by competitive exclusion due to their rapid colonization of the rhizosphere thus an important factor in disease control.
- » It is motile by means of multiple polar flagella. *P. fluorescens* has simple nutritional requirements and grows well in mineral salts media supplemented with any of a large number of carbon sources
- » *Pseudomonas fluorescens* produces viscosin which is a peptidolipid that enhances antivirality
- » One of many byproducts of plant cells include active oxygen such as superoxide which are toxic to microbes
- » Rhizosphere bacteria such as *P. fluorescens* possess superoxide dismutases to convert superoxide to hydrogen peroxide and catalases to convert peroxide to water. The presence of these enzymes contribute to *Pseudomonas fluorescens*'s tolerance to oxidative stress.
- » Production of secondary metabolites play an important role in plant disease suppression. Antibiotics such as pyrrolnitrin, pyoluteorin, and 2,4-diacetylphloroglucinol that inhibit phyto-pathogen growth are produced by *Pseudomonas fluorescens*
- » *Pseudomonas fluorescens* produces hydrogen cyanide and the siderophores pyochelone and pyoverdine which it uses to outcompete with many pathogenic bacteria for iron necessary for growth and suppress pathogens in the rhizosphere. These microbes have multiple polar flagella for motion and use siderophores (wing like ) to aid in their collection of iron
- » Ideal companion for integrated Disease Management

Application Mode	Per Hectare	Spray / Drench Rate / Ha
Pre colonisation Spray / Fertigation	1-2% tank mix solution Or 15 litres per Hectare	500-1000 Litres Use Higher concentration for lower spray rates
Bio Remediation Spray / Fertigation	5% Drench Solution	500-1000 Litres per Hectare
Seed Treatment	500ml-1L / 100kg of seed	