

● *Ganoderma boninense*, a white rot fungus, is posing a significant threat to the thriving oil palm industry in South-East Asia. This devastating pathogen is responsible for the Basal Stem Rot (BSR) disease, which wreaks havoc on oil palm plantations.



The Grim Reality:

- Infected oil palms eventually halt fruit production and collapse, impacting plantation productivity.
- Young palms succumb in 1-2 years; mature trees endure for only 3-5 years (Corley and Tinker, 2003).

The Challenge:

- Identifying BSR in its early stages is challenging as symptoms usually appear when the infection has reached 60-70% (Chong et al., 2017a).
- By this point, a significant portion of the palm's base is already damaged (Darmono, 2000).

Consequences:

- BSR remains asymptomatic until late stages (Chong et al., 2017a).
- Late detection hinders control efforts and makes the disease difficult to manage.
- Recurring Oil Palm infection & loss after repeated planting cycles.



Current Control Practices

Replanting (Preventive):
Felling, Chipping and debolling, Shredding or Mulching, ploughing and harrowing, Fallowing

Existing Palms (Curative):
Soil Mounding, Isolation Trenching, Surgery, Chemical Fungicide Injection

Shortcomings of Conventional Methods

Cleanliness during replanting is crucial. The current control methods employed focuses on removing diseased materials. However, these methods alone do not sufficiently reduce BSR. Curative approaches, although available, are financially burdensome, labor-intensive, and environmentally unsustainable.

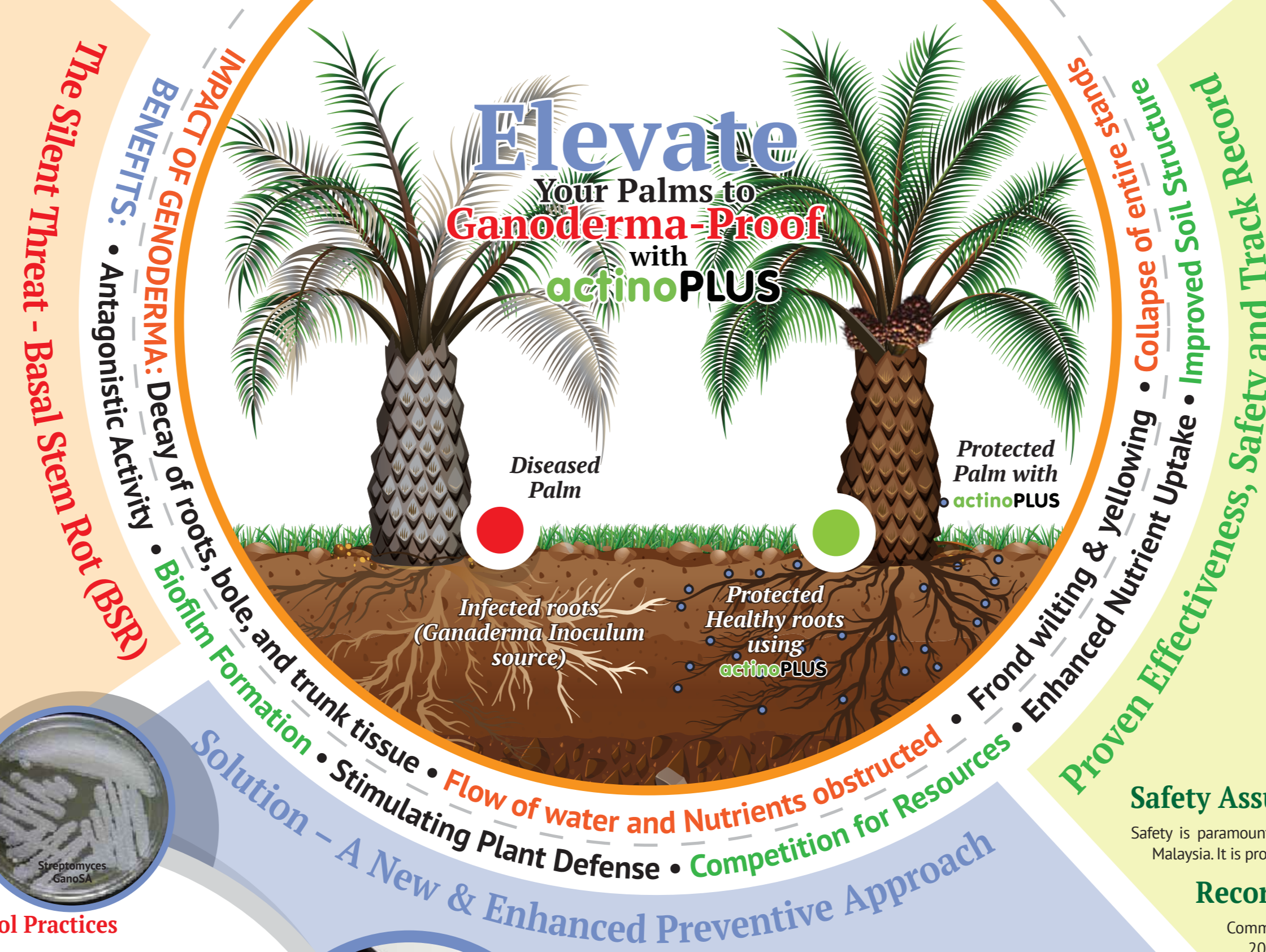


Introducing a new Integrated Strategy

We recommend enhancing current control practices of sanitation by synergising it with our revolutionary Biological Control Agent, Embio ActinoPlus (*Streptomyces GanoSA1*), to significantly minimize disease incidence. Broadly, the term biological control refers to the use of one organism to limit the growth and multiplication of another.

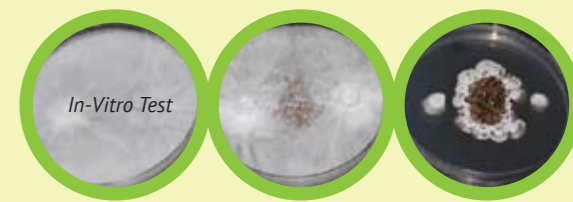
Meet Your Ally: *Streptomyces GanoSA1*

Streptomyces GanoSA1 is a naturally occurring soil bacterium within the *Streptomyces* genus. These remarkable microbes possess a range of talents, including the ability to produce antibiotics and enzymes, making them ideal guardians of oil palm rhizospheres—the vital soil zone surrounding the roots.



Effectiveness Evaluation

Our commitment to ensuring *Streptomyces GanoSA1*'s efficacy is evident through rigorous testing:



1 **Laboratory Testing @ GanoDROP laboratory, MPOB: (In-Vitro Test)**
A resounding 100% Percent Inhibition of Radial Growth (PIRG)

2 **Nursery Trial**

Measurement	Vegetative Growth Effect	Ganoderma Disease Control
Duration	10 Months	10 Months
Inoculation Method	-	rubber wood block (RWB) sitting technique.
Design	24 seedlings (12 treated, 12 control)	60 seedlings (30 treated, 30 control)
Dosages	monthly interval (9 applications, 50 g/seedling/application; at 4 to 12 months old seedling).	4 times (at 3, 4, 7 and 10 month old, 50g/seedling/application)
Results	Btw 11-18% enhancement	65.2% disease reduction

3 **Field Trial**

Duration	36 Months	8 Years (still ongoing)
Inoculation Method	Seedling Baiting Technique	Replanting (normal conditions)
Design	120 seedlings (60 treated, 60 control)	1260 Oil Palm (1001 treated, 259 control)
Dosages	applied 4 times (at 4, 6 and 9 month old, at 50g/seedling/application; and in planting hole, at 250 g/hole)	applied 4 times (at 4, 6 and 9 month old, at 50g/seedling/application; and in planting hole, at 250 g/hole)
Results	At 36 months, 75% of untreated seedlings were dead compared 6.6% in treated	Infected untreated seedlings observed starting 3rd year onwards compared to 6th year for treated, although minimal(2 out of 1001)

Safety Assurance

Safety is paramount, and *Streptomyces GanoSA1* has passed stringent toxicological tests at University Sains Malaysia. It is proven to be non-toxic, ensuring the well-being of your oil palm ecosystem.

Record of proven performance

Commercially applied in Skim Tanam Semula Sawit Pekebun Kecil (TSSPK) between 2015 – 2018, under the 10th Malaysia Plan Pascal Biotech delivered approximately 420K sachets covering 7 states in Peninsular Malaysia. A 3.8 times return of investment (ROI) to the government based on the total sales revenue obtained from the study area.

Market Appeal:

- Reduce expenses on chemical fungicides.
- Gain a competitive edge with a sustainable approach.
- Elevate your brand with eco-friendly practices.
- Light & Portable - Effortless Application for Maximum Protection
- Healthier palms mean higher-quality fruit and increased harvests

