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HYDRO-HEXA™

Crop Protection Product

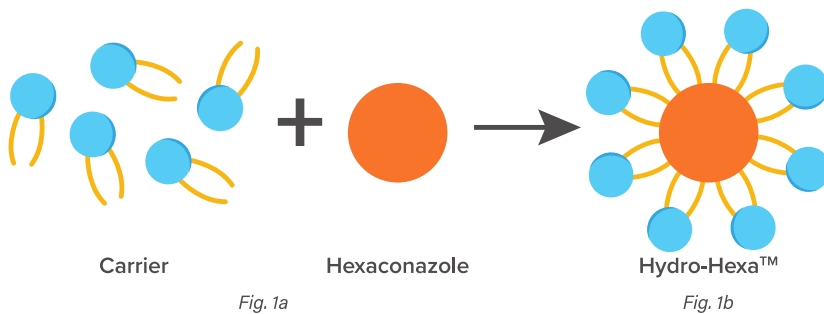


What is HYDRO-HEXA™

Hydro-Hexa™ is a precision delivery system containing Hexaconazole, developed to manage Ganoderma in mature oil palms. It moves from a single trunk injection point to the roots and infected tissues, reaching these target areas without pressure or special equipment. This simple and efficient method reduces application costs and supports large-scale management of Ganoderma disease.

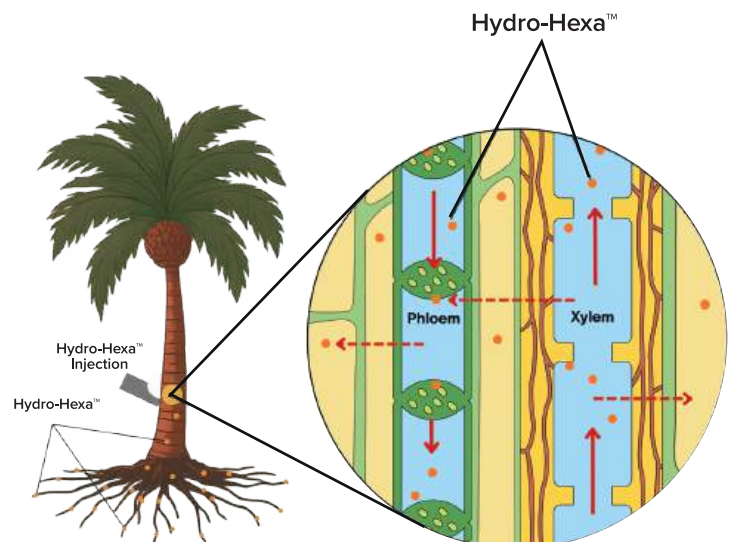
HYDRO-HEXA™ Technology

Hydro-Hexa™ utilizes an advanced encapsulation system engineered to provide a sustained and pH-responsive release of Hexaconazole.



Its unique physicochemical properties enable bidirectional translocation through both the xylem and phloem, as well as diffusion across cellular membranes, ensuring efficient distribution to roots and infected tissues.

Under neutral conditions, the system maintains a sustained release profile, whereas exposure to acidic environments—typical of infected tissues—accelerates release kinetics, thereby enhancing the fungicidal effect.



In-vitro Studies

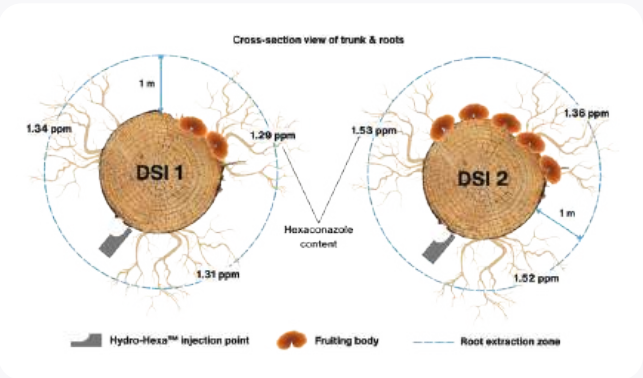
In-vitro agar assays demonstrated that Hydro-Hexa™ exhibited greater antifungal efficacy than Hexaconazole 5% SC, with a minimum inhibitory concentration (MIC) half that of the commercial reference.



PRODUCT	M.I.C (ppm)
Hexaconazole 5% SC	0.02
Hydro- Hexa®	0.01

Translocation Studies

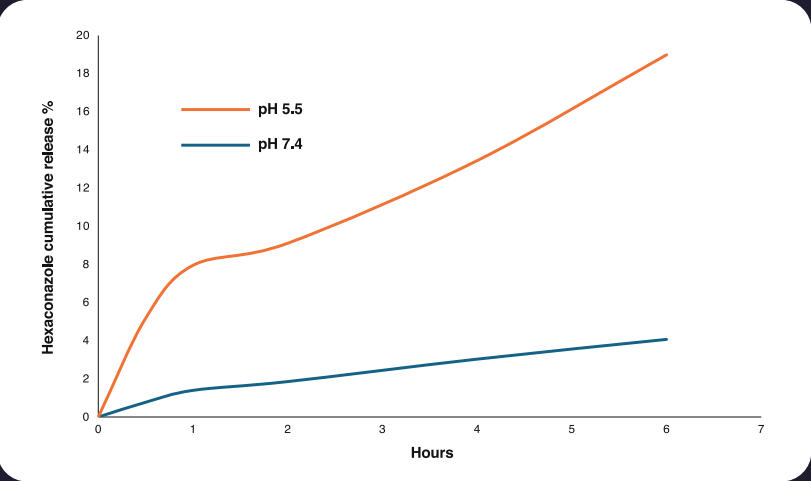
In-vivo translocation studies revealed that Hydro-Hexa™ was uniformly distributed across the root system and accumulated at lesion zones within infected palms, indicating effective systemic translocation to target areas.



SAMPLING AREA			
PALM ID	A	B	C
DSI	2	2	2
HEXACONAZOLE CONTENT (PPM)	2.00	1.20	1.92
pH (1% SOLUTION)	5	5	5

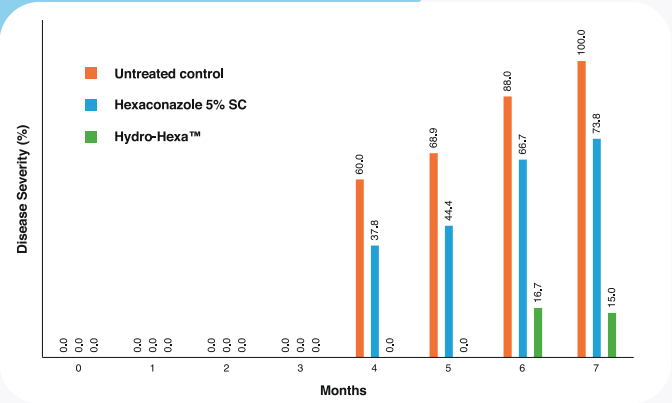
Release Studies

In-vitro release study of Hydro-Hexa™ demonstrated a linear release profile at neutral pH and an accelerated release rate under acidic conditions, substantiating its pH-responsive mechanism and targeted delivery behavior within infected tissues.



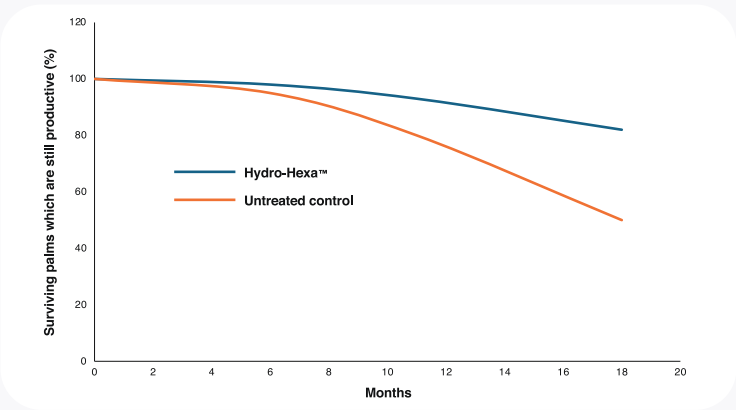
Efficacy Studies (Seedlings)

A nursery study consisting 45 seedlings inoculated with Ganoderma demonstrated that treatment with Hydro-Hexa™ significantly reduced the rate of disease progression.



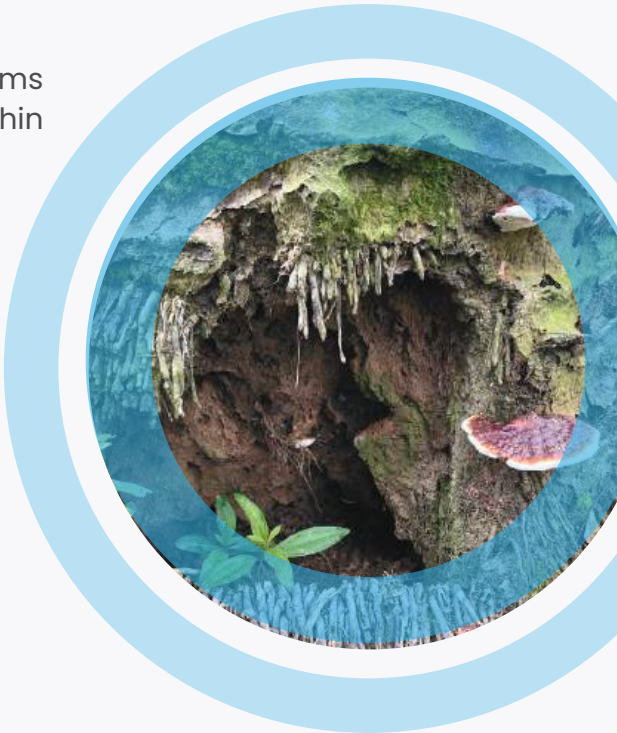
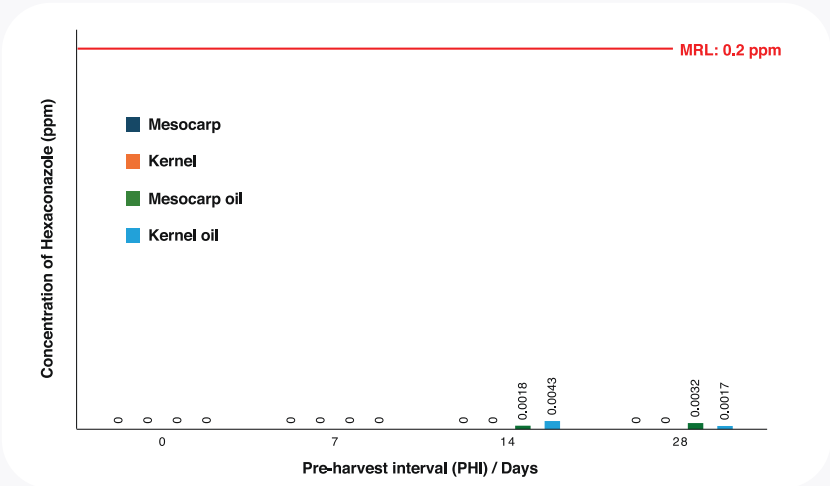
Efficacy Studies (Matured Palms)

In a field trial involving 40 infected mature palms, treatment** with Hydro-Hexa™ sustained fruit production in 80% of palms after one and a half years, whereas 50% of the untreated control palms had declined and ceased fruit production. **The treatment program consists of 3 doses of Hydro-Hexa™ (72 mL each, containing 4.5g of Hexaconazole). Each dose is applied at 5–6-month intervals.



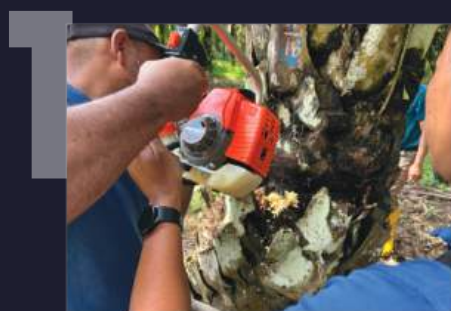
Residue Studies

Hexaconazole residues in fruit and oil matrices from palms treated with Hydro-Hexa™ remained negligible and are within the established maximum residue limit (MRL) standards.



Easy Application

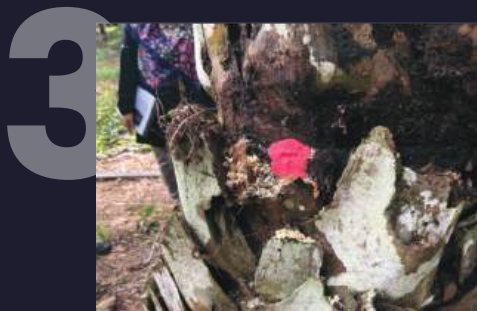
With Hydro-Hexa™, no pressure pump is required to deliver the active ingredient into the palm's vascular system. Simply drill a hole in the trunk, insert the sachet tip, squeeze until the contents are fully dispensed, and seal the hole with modelling clay or clay.



Drill a hole



Inject Hydro-Hexa™ directly from pack



Seal the hole

Visible Recovery After Treatment

Field observations showed visible improvement in Ganoderma-infected oil palms four months after Hydro-Hexa™ application. Compared with Day 0, the treated palms exhibited healthier canopy development, improved frond condition and a reduction in disease severity symptoms.

DSI 1 Palm



Day 1 of treatment

After 4 months

DSI 2 Palm



Day 1 of treatment

After 4 months



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