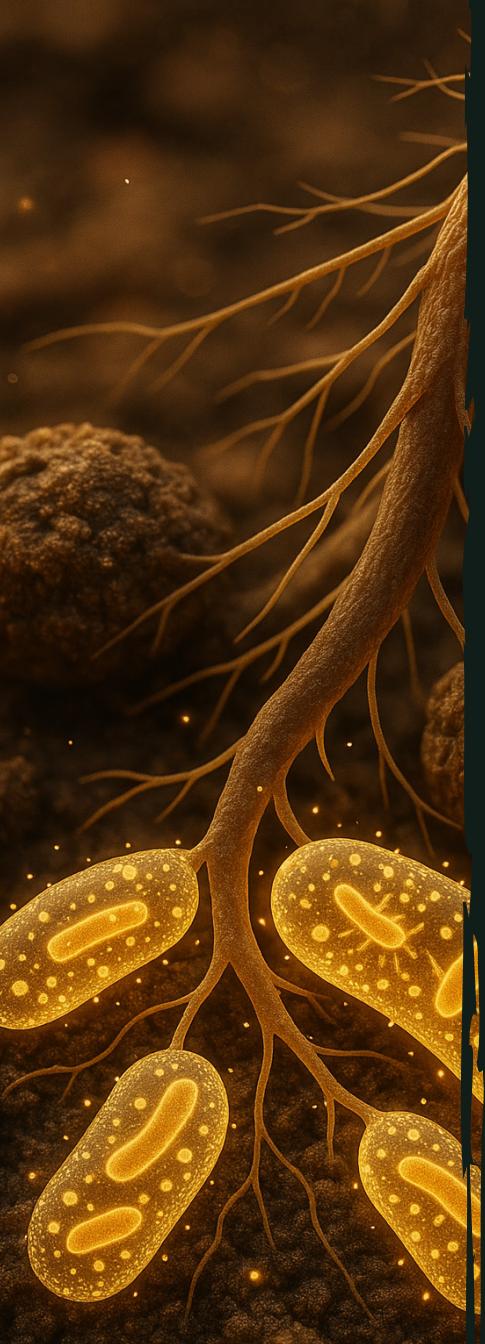


MicrobeBio®

MICROBEBIO X9: ADVANCED MICROBIAL BIO- SHIELD FOR VIRAL AND SOIL- BORNE DISEASE RESISTANCE





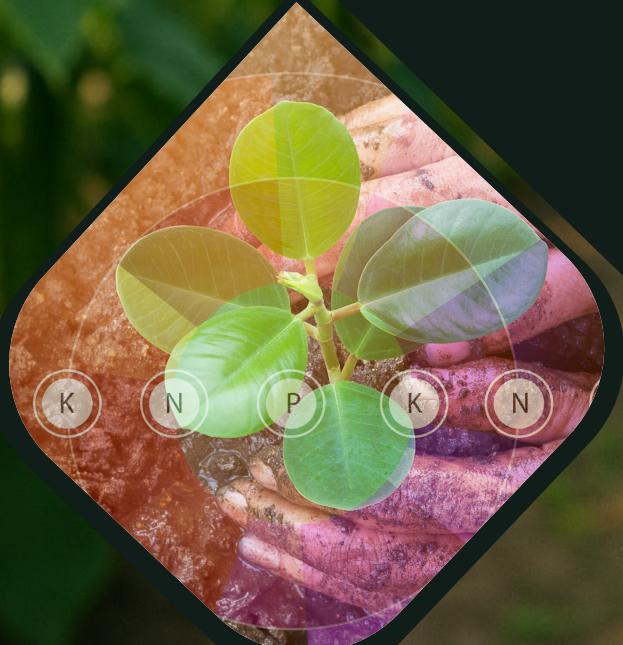
MicrobeBio X9 is a next-generation microbial biostimulant scientifically formulated to strengthen plant immunity against viruses and soil-borne pathogens while enhancing root growth, nutrient uptake, and overall plant vitality.

It integrates a consortium of nine synergistic microbes that create a resilient rhizosphere capable of suppressing viral transmission vectors, detoxifying soil, and stimulating the plant's natural defense systems.





MICROBIAL COMPOSITION AND THEIR CORE FUNCTIONS





AZOSPIRILLUM BRASILENSE



FUNCTION:

Nitrogen-fixing bacterium that produces phytohormones (IAA, GA) and stimulates root elongation.

BENEFITS:

Enhances plant vigor and resistance by improving nitrogen metabolism and increasing systemic tolerance to stress and viral infections such as Tobacco mosaic virus (TMV) and Tomato yellow leaf curl virus (TYLCV).



PSEUDOMONAS FLUORESCENS

FUNCTION

Produces antibiotics (pyoluteorin, phenazine) and siderophores that suppress pathogenic fungi, bacteria, and virus-carrying vectors.

BENEFITS

Inhibits viral spread by disrupting insect vectors (whiteflies, aphids) and boosts systemic acquired resistance (SAR) against Cucumber mosaic virus (CMV), Tomato spotted wilt virus (TSWV), and Banana bunchy top virus (BBTV).



BACILLUS SUBTILIS



BACILLUS AMYLOLIQUEFACIENS



FUNCTION:

Forms protective biofilms and secretes lipopeptides (surfactin, iturin, fengycin) that degrade viral proteins and block pathogen entry.

BENEFITS:

Induces immune priming, helping plants resist Pepper mild mottle virus, Papaya ring spot virus, and Banana streak virus.

FUNCTION:

Produces antimicrobial compounds and enzymes that degrade cell walls of virus-carrying organisms.

BENEFITS:

Enhances tolerance to Tomato leaf curl virus (ToLCV) and Cucumber green mottle mosaic virus (CGMMV) through ISR (Induced Systemic Resistance).



TRICHODERMA HARZIANUM

FUNCTION: Mycoparasitic fungus that colonizes the rhizosphere, releasing enzymes and elicitors to trigger plant defense mechanisms.

BENEFITS: Boosts resistance to viral and fungal co-infections, protecting crops from Rice tungro virus, Tomato bushy stunt virus, and Groundnut rosette virus.

RHIZOPHAGUS INTRARADICES

FUNCTION: Symbiotic fungus enhancing nutrient exchange and immune signaling between soil and plant roots.

BENEFITS: Strengthens barrier against viral infection by improving phosphorus uptake and triggering salicylic acid pathways against Potato virus Y (PVY) and Tobacco mosaic virus.



PAENIBACILLUS POLYMYXA



AZOTOBACTER CHROOCOCCUM

FUNCTION: Produces polymyxins and hydrolytic enzymes that disrupt harmful microbial populations.

BENEFITS: Reduces viral transmission in crops susceptible to Maize dwarf mosaic virus and Sugarcane mosaic virus by stabilizing root microbiome balance.

FUNCTION: Fixes atmospheric nitrogen and releases growth regulators and antifungal metabolites.

BENEFITS: Builds overall plant resistance and recovery from viral damage such as Tobacco necrosis virus and Potato leaf roll virus.



GLUCONACETOBACTER DIAZOTROPHICUS

FUNCTION: Endophytic nitrogen-fixing bacterium that enhances photosynthesis and root strength.

BENEFITS: Improves plant energy metabolism and resilience to Banana streak virus and Rice tungro spherical virus through enhanced antioxidant defense.

MECHANISM OF ACTION

MicrobeBio X9 works through three integrated biological pathways:

1. RHIZOSPHERE SHIELDING:

Creates a dense microbial network that occupies infection sites, reducing viral vector survival and replication.

2. SYSTEMIC RESISTANCE INDUCTION (ISR & SAR):

Activates salicylic acid, jasmonic acid, and ethylene signaling pathways to prepare plants for rapid immune responses.

3. VECTOR INTERFERENCE:

Produces volatile compounds that repel aphids, thrips, and whiteflies—major carriers of plant viruses.



CONTROLLED VIRAL PATHOGENS



MicrobeBio X9 has demonstrated preventive and suppressive action against multiple viral diseases, including:

- Tomato yellow leaf curl virus (TYLCV)
- Cucumber mosaic virus (CMV)
- Tobacco mosaic virus (TMV)
- Banana streak virus (BSV)
- Rice tungro virus (RTV)
- Potato virus Y (PVY)
- Pepper mild mottle virus (PMMV)
- Papaya ring spot virus (PRSV)
- Tomato spotted wilt virus (TSWV)
- Sugarcane mosaic virus (SCMV)
- Maize dwarf mosaic virus (MDMV)
- Potato leaf roll virus (PLRV)



KEY BENEFITS

- Viral and pathogen suppression through multi-microbial synergy
- Enhanced immunity via induced systemic resistance
- Improved nutrient uptake and soil microbial balance
- Higher chlorophyll and Brix levels, improving flavor and yield quality
- Reduced chemical dependence, supporting regenerative agriculture
- Extended shelf life and post-harvest quality
- Environmentally safe and suitable for organic farming systems

SUSTAINABLE AGRICULTURE FOR THE FUTURE

MicrobeBio X9 exemplifies MicrobeBio's vision of merging biotechnology with sustainability. By leveraging naturally occurring beneficial microbes, X9 not only reduces viral losses but also enhances productivity, resilience, and soil fertility for future generations of farmers.

*THIS REVIEW WAS SUPPORTED BY
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