



Funder Potassium-Based Agricultural SAP (SAP Soil Moisture Retention Agent)

Revolutionize Your Agriculture, Conserve Water

Soil Micro-Reservoir · High Water Efficiency · Higher Yields

Super Absorbent Polymer (SAP) for Multi-Scenario Agriculture.

Recommended Application Depth: 15-30cm.



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Zhejiang Funder Import and Export Trade Co., Ltd.

Brand Strength

A major Chinese SAP (superabsorbent polymer) production base with 200,000-ton annual capacity; ISO 9001 / 14001 certified.

Originated from China's national "863" Program SAP industrialization; backed by Shengli Oilfield Changan Holding Group (SZSE-listed subsidiary 002476), with a provincial technical center and post-doctoral research workstation.

Professional teams in China, the U.S., Australia, and Russia, serving major agricultural markets in Europe, the Americas, and worldwide.

1. Product Overview

Funder Potassium-Based Agricultural SAP is a high-performance functional polymer material (potassium-based polyacrylate/polyacrylamide composite) that rapidly absorbs 300–500 times its own weight of water during irrigation or rainfall, slowly releasing it during dry periods according to crop demand to form a "soil micro-reservoir" in the soil. Through a unique copolymerization process, nano-grade clay mineral (attapulgite) is incorporated to enhance water retention, saline-alkali resistance, and soil structure improvement. The product is 100% biodegradable, leaves no microplastic residue, and aligns with sustainable agriculture and "de-plasticization" trends.



DRY Funder SAP
(Super Absorbent Polymer)



HYDRATED Funder SAP
(After Water Absorption)

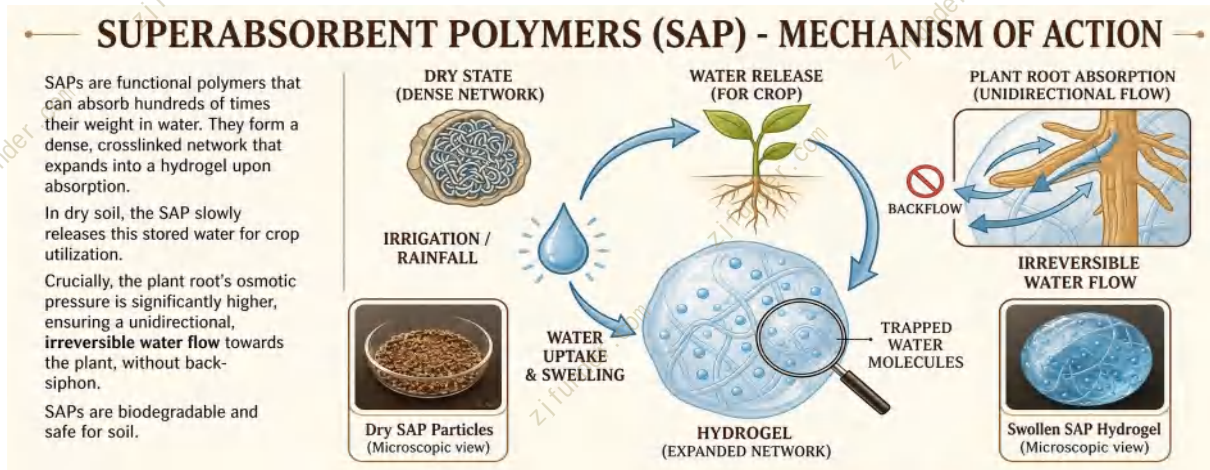


Funder SAP Appearance: Dry granules (left) and hydrated gel (right)

2. Core Principle: Soil Micro-Reservoir

The water-retaining granules absorb water and swell into a clear gel, forming an independent network of water sacs in the root zone that capture rainfall and irrigation water and release it slowly; evenly dispersed microparticles avoid localized soil uplift caused by concentration, ensuring uniform water distribution in the root zone and continuous supply to plants.

Funder Potassium-Based Agricultural SAP centers on a "soil micro-reservoir" mechanism: each granule rapidly swells into a clear hydrogel upon absorbing water, forming interconnected micro water sacs in the root zone that lock rainfall and irrigation water near the roots, preventing evaporation and deep-percolation losses, and slowly release water according to water potential during dry periods for a continuous supply. The absorption – release cycle is repeatable, keeping rhizosphere soil moisture stable for a long time, significantly reducing irrigation frequency and total water use, especially suitable for drip irrigation, micro-sprinklers, and other water-saving systems. The particles are evenly dispersed in soil without causing compaction or soil heaving; plant root suction ($17 - 18 \text{ kg/cm}^2$) exceeds the water-retention force of the SAP ($13 - 14 \text{ kg/cm}^2$), so water flows one-way without "back-suction." The potassium-based formula is salt- and UV-resistant, remains active for 3 – 5 years, and ultimately degrades into nutrients and minerals, safe and environmentally friendly.



Precise Subsoil Moisture: Water Directly to the Root Zone



Soil and Root Condition Comparison Before and After Using Funder SAP

3. Composition and Degradation Mechanism

Funder Potassium-Based Agricultural SAP is mainly composed of polyacrylamide (PAM) and attapulgite. By introducing nano-grade clay minerals into the polymer network, the product overcomes the high cost, poor water release, weak saline-alkali resistance, poor stability, and difficult degradation of conventional water-retaining agents, featuring green, eco-friendly, fully degradable, and pollution-free characteristics.

Main Components

Polyacrylamide (PAM) is a high-molecular-weight polymer formed by free-radical polymerization of acrylamide (AM) monomers. Its backbone carries a large number of amide groups ($-\text{CONH}_2$), which readily form hydrogen bonds with water molecules and soil particles.

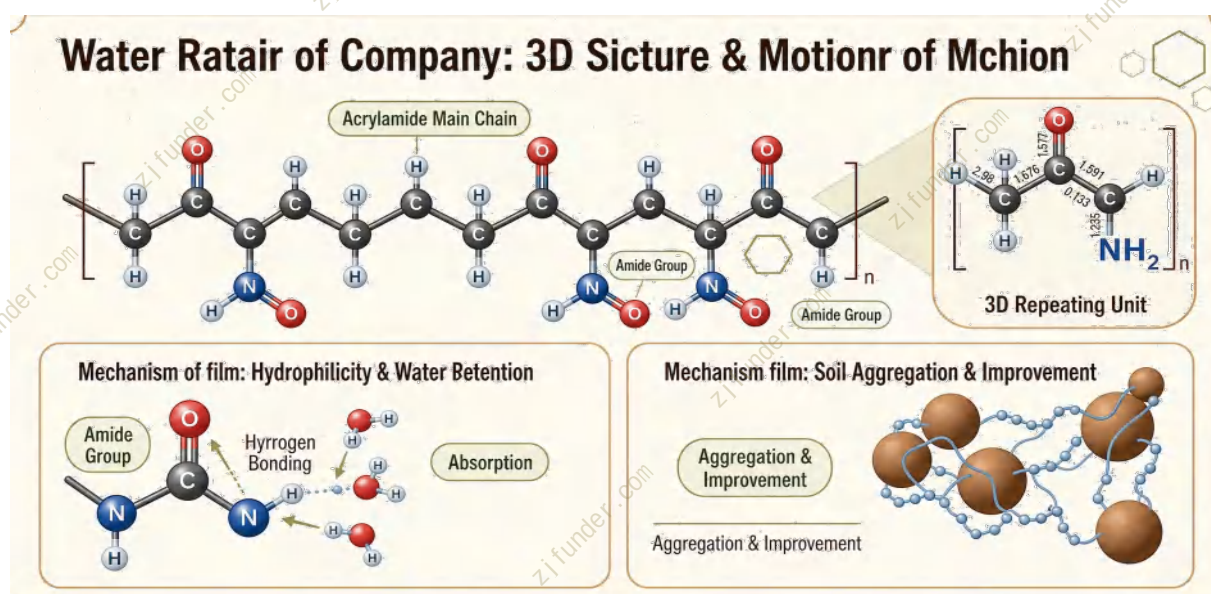


Figure 1: PAM 3D chain structure and the mechanism of hydrophilic water retention and soil aggregation improvement

Attapulgite (Attapulgite / Palygorskite) is a hydrous magnesium-aluminum silicate clay mineral with a 2:1 chain-layer structure, containing abundant natural rod-shaped crystals and classified as a natural one-dimensional nanomaterial.



Figure 2: Attapulgite nano-rod crystal structure, ion exchange, and trace-element release schematic

Functions of Polyacrylamide (PAM)

The amide groups on the PAM backbone can form hydrogen bonds and adsorption forces with soil particles, maintaining soil structure, preventing crusting, improving infiltration, reducing surface runoff and soil erosion, and enhancing soil fertility retention. It is an efficient soil conditioner.

PAM Degradation Pathways

PAM can gradually degrade in soil and natural environments through oxidation, light, microorganisms, and fungi, eventually converting into harmless small molecules:

Oxidative degradation: Peroxide impurities decompose to generate primary free radicals, initiating chain auto-oxidation; elevated temperature or trace reducing substances accelerate this process. PAM chain free radicals further trigger α - and β -scission, leading to backbone breakage and rapid molecular-weight decline.

Photodegradation: Natural light can directly degrade PAM. Under aerobic conditions, light absorption produces hydroxyl radicals that abstract hydrogen atoms from the PAM chain to form PAM radicals, which react with oxygen causing backbone cleavage.

Biodegradation: Amide groups on the PAM chain are easily hydrolyzed, providing a nitrogen source for soil bacteria; the carbon-carbon backbone can be used as a carbon source by microorganisms and eventually mineralized into small molecules.

Microbial Degradation

Soil microorganisms hydrolyze, ionize, and protonate long PAM chains via extracellular enzymes, splitting them into oligomers, dimers, and monomers as intermediates; microorganisms further decompose them. Under aerobic conditions CO_2 , H_2O , and energy are mainly produced; under anaerobic conditions CH_4 , H_2S , etc., are produced with energy release.

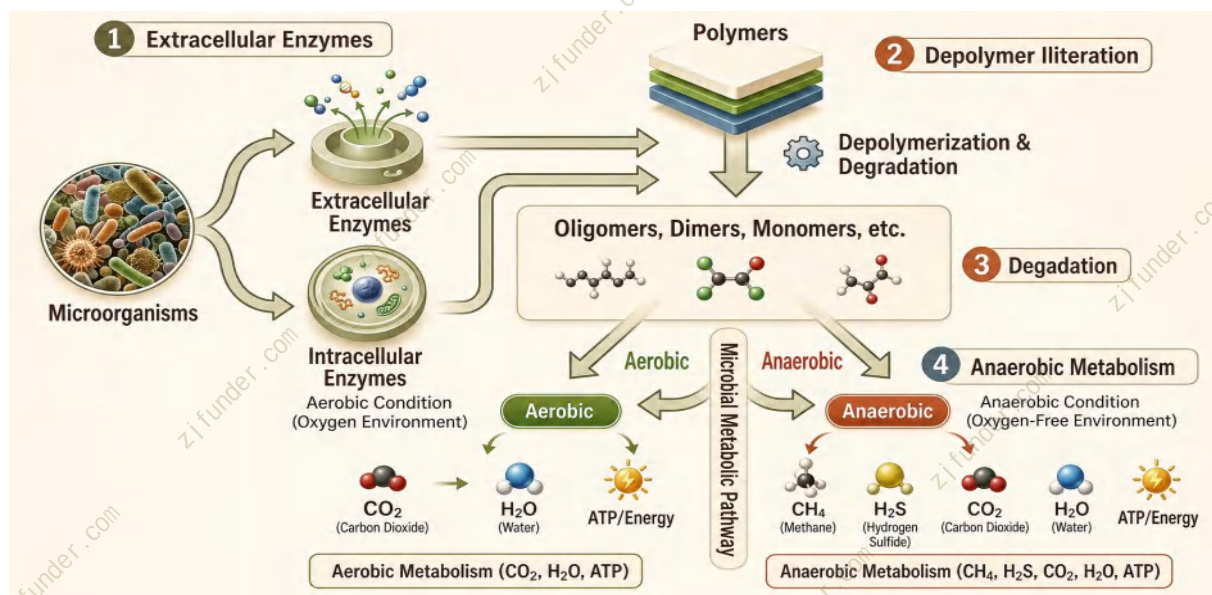


Figure 3: Complete PAM degradation process by microorganisms (extracellular/intracellular enzymes, aerobic/anaerobic metabolic pathways)

Fungal Degradation

Fungi can secrete non-specific extracellular degradation enzyme systems that depolymerize PAM into water-soluble secondary metabolites through free-radical redox reactions; ^{14}C tracing experiments show that nearly 90% of non-water-soluble polymers can be converted into water-soluble molecules and enter hyphae, and after multi-stage intracellular metabolism produce CO_2 , ammonia, and other metabolites.

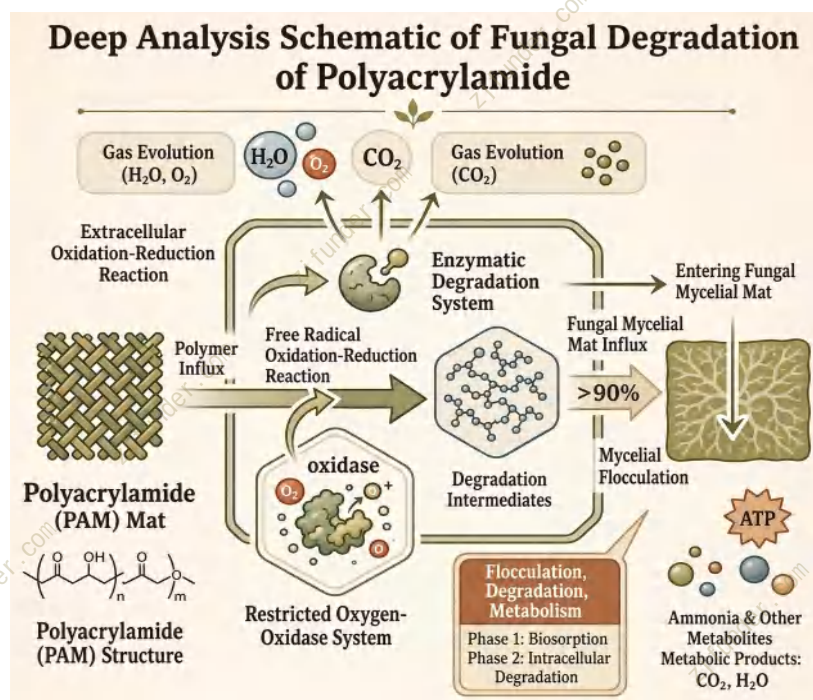


Figure 4: Schematic of deep PAM degradation by fungi (>90% non-water-soluble polymers converted to water-soluble molecules)

Role of Attapulgit

Attapulgit has strong ion-exchange and metal-ion adsorption capacities, releasing about twenty kinds of metal ions through ion exchange to supplement soil trace elements; it also improves soil physical properties and increases soil permeability, synergistically enhancing water retention, fertility retention, and soil conditioning with PAM.

Funder Potassium-Based Agricultural SAP combines high water absorption and retention, soil improvement, and complete degradation, remaining active in soil for 3–5 years and eventually converting into beneficial nutrients and inorganic minerals, leaving no white pollution.

4. Key Performance Parameters

Parameter	Value / Description
Water Absorption Ratio	300–500 times its own weight in pure water; retains 60–100 times absorption capacity in 0.9% saline solution
Effective Service Life	3–5 years per application (active period 3–6 years for some crops)
Water-Saving Performance	Increases precipitation-use efficiency by 40%+, saves up to 1/3 of irrigation water
Fertilizer Retention & Efficiency	Locks water-soluble fertilizers, increases fertilizer-use efficiency by ~30%, and reduces chemical fertilizer use by 30%
Weather Resistance	UV-resistant (structure and water absorption remain stable under strong light); wide temperature-range adaptation
Soil Conditioning	Adjustable pH 6.0–8.0, supplements key nutrients such as K and Fe, and suppresses salt damage
Safety	Non-toxic, harmless, food-grade safe, no microplastic residue

5. Six Core Advantages



Funder SAP improves soil structure and prevents compaction

High Water Efficiency: The micro-reservoir continuously supplies water, reducing irrigation frequency and cost and alleviating drought stress.

Higher Yields & Income: Stable water supply promotes crop growth, shortens maturity, and improves yield and quality.

Fertilizer Retention & Slow Release: Locks water and fertilizer simultaneously, reducing loss and leaching and improving nutrient-use efficiency.

Soil Quality Improvement: Absorption–release volume expansion reaches over 300 times, loosening soil, increasing porosity and aeration, and promoting root development.

No Back-Suction: Plant root suction ($17\text{--}18\text{ kg/cm}^2$) exceeds SAP water-holding force ($13\text{--}14\text{ kg/cm}^2$), so water flows one-way and never reverses.

Salt & UV Resistant, Green & Eco-Friendly: Saline-alkali and UV-aging resistant; 100% biodegradable into nitrogen, potassium nutrients and attapulgite minerals, permanently optimizing soil.

6. Competitive Comparison Tests

To visually illustrate the positioning of Funder Potassium-Based Agricultural SAP in water absorption performance, this section compares it with ordinary commercial water-retaining agents and products from Manufacturers A, B, C, and D across multiple dimensions.

Water Absorption Ratio & Rate Comparison

The figures below compare the final water absorption multiples within 180 min and the initial-rate differences among different water-retaining agents.

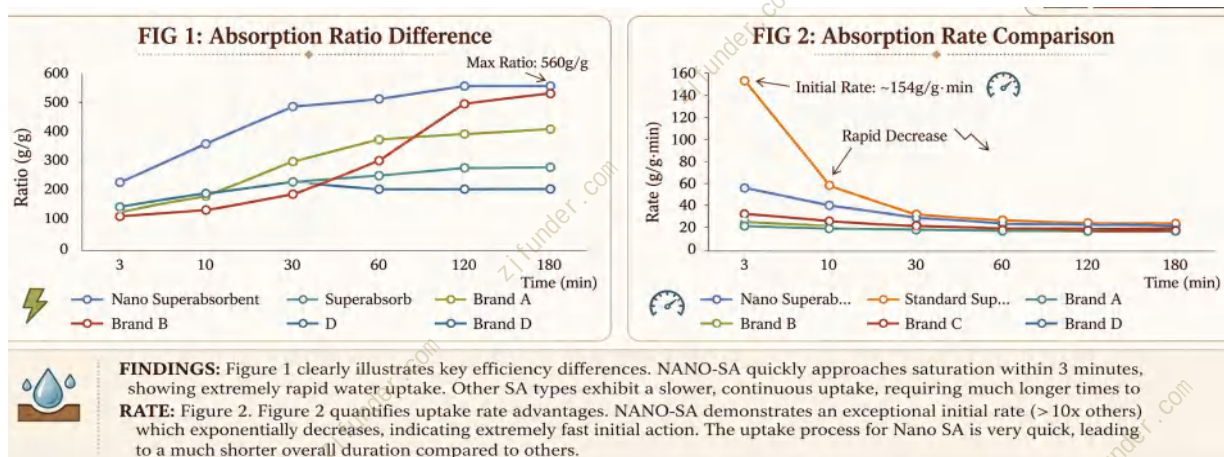


Figure 5: Comprehensive analysis of water absorption ratio and rate differences among various water-retaining agents

Figure 1 (water absorption ratio comparison) shows that Funder Potassium-Based Agricultural SAP (nano water-retaining agent) reaches a final absorption ratio of about 560 g/g within 180 min, significantly higher than ordinary water-retaining agents and samples from Manufacturers A, B, C, and D.

Figure 2 (water absorption rate comparison) shows that the nano water-retaining agent has an initial absorption rate of about 154 g/g·min at 3 min, far higher than ordinary agents and other samples; the rate then decreases exponentially, indicating the absorption process rapidly approaches saturation after starting.

Overall, the nano water-retaining agent can absorb water close to saturation within 3 min, while ordinary agents and commercial samples usually require 30 min or more. This means under natural rainfall or short irrigation, Funder products can capture and store water more efficiently, reducing surface runoff loss.

Repeated Water Absorption Performance Comparison

After being placed in soil, water-retaining agents undergo countless wet-dry cycles with crop growth, so repeated absorption capacity (durability) is a key indicator of lasting efficacy. The figure below compares the ratio retention of the nano water-retaining agent and Manufacturer B, C, D products after ten absorption-drying cycles.

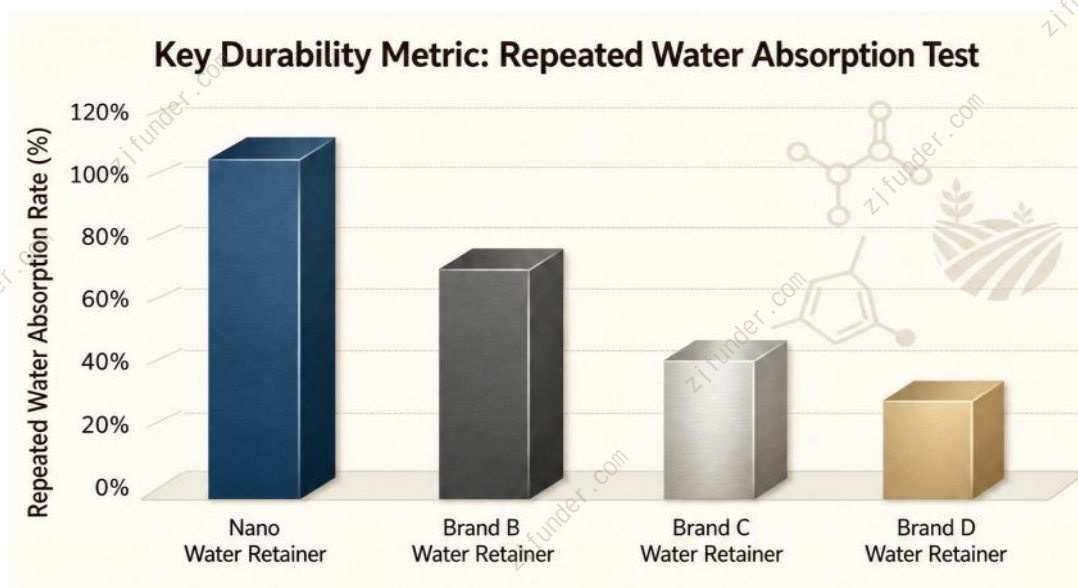


Figure 6: Water absorption ratio retention after ten repeated absorption cycles for different water-retaining agents

Test results show the nano water-retaining agent still retains about 70% of its absorption ratio after the 10th cycle, performing excellently; Manufacturer B and C samples drop to about 50% and 40%, respectively, while Manufacturer D drops to about 30%. This indicates Funder Potassium-Based Agricultural SAP decays more slowly during long-term use, significantly reducing farmers' reapplication frequency and overall cost.

7. Application Method & Dosage

Mix Funder SAP granules evenly with soil/substrate

Method	Applicable Crops	Dosage / Key Points
Mechanical sowing	Field row crops	Mix with fertilizer at 3–5 kg/mu, apply in 10–20 cm seed furrow
Furrow application	Peanuts, wheat, and other row crops	3–5 kg/mu, evenly placed in 10–20 cm furrow
Broadcasting	Leafy vegetables, lawns, large-scale nurseries	6–10 kg/mu, surface-apply and mix into 5–10 cm soil layer
Hole application	Tomatoes, peppers, and other hole-planted crops	Mix SAP with soil 1:5–10, apply in 10–20 cm hole
Seed coating	Improve germination rate	0.5%–1.0% hydrogel coats seeds, air-dry before sowing
Root-dip transplanting	Seedlings, fruit trees, afforestation	Prepare gel at SAP:water = 1:100–150, dip roots 3–5 s, cover with film to retain moisture; survival rate 95%+



Funder SAP Application Methods

8. Typical Crop Application Scenarios

Field crops (wheat, corn, peanuts, etc.): furrow application / sowing mix, 10–15 cm deep, 3–5 kg/mu, significantly reducing irrigation dependence.

Economic forests & fruit trees: ring/strip trenches in root zone (30–50 cm deep), 20–80 g/plant (depending on tree size).

Avocado: ring/strip trenches 5–10 cm deeper than standard fertilizer line, fertilizer reduction 30–50%.

Date palm: optimized for desert sandy soil, 150–200 g/tree (15–20 cm trunk diameter), can extend irrigation interval by 15–30 days.

Nurseries & vegetables: bare-root transplant dip gel (1:100); for root-balled/container transplants, mix 50–400 g dry crystals into potting soil.

Potato (benchmark case): maintains 60–80% soil moisture, significantly improving tuber uniformity and total yield (potatoes consume ~140 L water per kg yield; SAP greatly reduces water demand).



Schematic of SAP crops across agricultural scenarios



Field crop application



Greenhouse flowers & nurseries: reduce watering frequency



Desert arid regions: date palms and desert planting



Golf course and sports turf maintenance



Urban greening & landscape engineering



Afforestation & ecological restoration: improve seedling survival

9. Environmental Protection & Degradation

Remains highly active in soil for 3–5 years; after the service cycle, it naturally biodegrades into beneficial nitrogen and potassium nutrients and attapulgite inorganic minerals, leaving no harmful residues, permanently optimizing soil physical structure and supporting "chemical-fertilizer reduction" and sustainable agriculture development.



10. Target Markets & Customers



Funder SAP serves agricultural customers across five continents

Targeting the Middle East / North Africa (urban greening and food security projects in water-scarce countries such as Saudi Arabia and the UAE), Australia / South Africa (drought-prone livestock and agricultural belts), Europe and the U.S. (organic agriculture and government environmental agencies with strict environmental regulations), as well as agricultural powers such as Ukraine, Brazil, Argentina, Egypt, Kazakhstan, and Canada.

11. Cooperation & Services

Factory-direct supply with source-level quality; supports low MOQ flexible trial orders.

Standing inventory, ready to ship, ensuring season-critical delivery.

Multilingual technical materials and global case-study support.

12. Contact Us

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Note: The above performance parameters are based on standard laboratory tests and typical field/engineering cases; actual performance may vary depending on operating conditions, application rate, and environmental factors.