Luo Bu

What is Drone-Grade MKP?

SECTION 01

Company Overview

Professional Fertilizer Manufacturer

A manufacturer focused on phosphate-based fertilizers

Robust supply chain and rigorous quality assurance

Pioneer of Drone-Grade MKP

Specialized in the production of Drone-Grade MKP

High solubility and purity, designed for UAV applications

Production Capacity

Daily production capacity: **200 MT**

Located in one of China's four major phosphate ore bases

covering an area of over **30 acres**

Company Orientation

Sichuan Luobu adheres to the philosophy of quality as the cornerstone, customer focus as the priority, innovation as the driving force, and technology as the foundation.

SECTION 02

Product Portfolio

Comprehensive fertilizer manufacturer for modern agriculture

Drone-Grade MKP

$KH_2PO_4 \geq 99\%$

$P_2O_5 \geq 51.5\%$

$K_2O \geq 34\%$

UAV application

Crystal MKP

$KH_2PO_4 \geq 99\%$

$P_2O_5 \geq 52\%$

$K_2O \geq 34\%$

Fertigation

Foliar Spraying

Water Soluble Fertilizers （NPK）

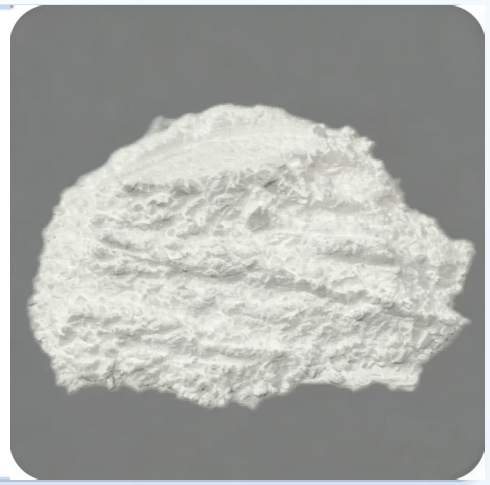
NPK 30-10-10+TE

NPK 20-20-20+TE

NPK 15-15-30+TE

Foliar Application

Drip Irrigation



Liquid Fertilizers

P_2O_5 (g/L): 400

K_2O (g/L): 500

pH (1:250 dilution): 7.0-9.0

UAV Application

Fertigation

SECTION 03

Drone-Grade vs. Crystal MKP: Why do They Differ in P_2O_5 Content?

Crystal MKP: Neutralization Method

A mild physical crystallization process

Crystals are formed through evaporation, concentration, and cooling crystallization, with no intense chemical reactions involved.

Minimal loss of phosphorus, high content

Phosphorus volatilization is minimal. Therefore, the P_2O_5 content can reach or approach the theoretical value (usually ≥52%).

Drone-Grade MKP: Centrifugal Spray Drying Process

Phosphorus Content at High Temperature

During high-temperature drying, some MKP converts to potassium metaphosphate. Standard tests only measure orthophosphate, making the reported P_2O_5 value appear lower.

Trade-off between performance and content

A small amount of P_2O_5 content is sacrificed in exchange for superior physical properties for UAV applications (fine particle size and good fluidity).

SECTION 05

Key Challenges of Crystal MKP in UAV Application

3.1 Dissolution Speed

(1 kg Drone-Grade MKP in 20 L water at 20°C)

Crystal MKP

20-30 min

at 20-25°C （stirring requirement）

Drone-grade MKP

2-3 min

in UAV Application

Requires continuous stirring

Risk: Incomplete dissolution may cause sediment and nozzle clogging.

The Time Gap Problem

Crystal MKP needed time — **25 min**

UAV window available — **2.5 min**

Only 10% of required time available

SECTION 06

Drone-Grade MKP vs Crystal MKP Comparison

Parameter	Drone-Grade MKP	Crystal MKP
Dissolution Speed	2-3 minutes	20-30 minutes
Stirring Requirement	Minimal	Continuous
Insoluble Matter	Strictly Controlled	Standard Level
UAV Compatibility	Optimized	Not Optimized
Leaf Retention	Improved	Limited

SECTION 07

Why Dissolution Speed Matters

The Performance Chain

Faster Dissolution → **Uniform Concentration** → **Stable Droplet Distribution**

> **In low-volume aerial application, formulation quality directly determines field performance.**

Impact on Field Operations

- No waiting time for dissolution
- Reduced tank preparation time
- More flight cycles per day
- Lower operational costs

SECTION 08

3.2 Leaf Retention Under Strong Airflow

Droplet Bounce-off Under Rotor Airflow

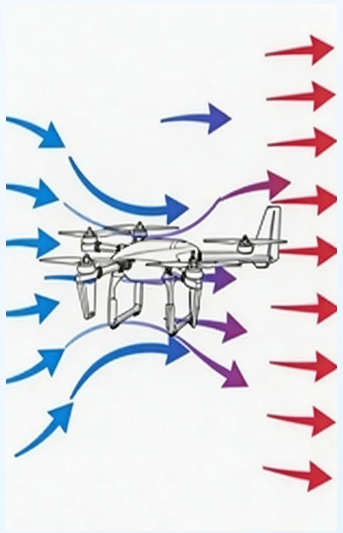
1. Strong downwash airflow from UAV rotors
2. Fine droplet atomization
3. Droplets may bounce off leaves

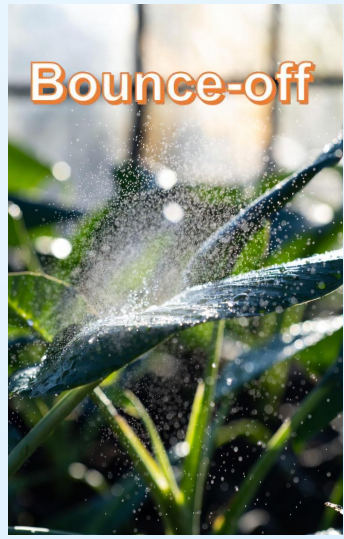
3.3 Compatibility

- Alkaline fertilizers
- Products containing Ca^{2+} , Mg^{2+} , Zn^{2+} , Fe^{2+} /Fe^{3+} , Cu^{2+} ,CO_3^{2-}
- Avoid high-temperature & high-concentration application.

Result:

- Low nutrient absorption efficiency results from insufficient droplet adhesion under high rotor wind pressure.
- In aerial application systems, retention performance directly determines **nutrient utilization efficiency**.





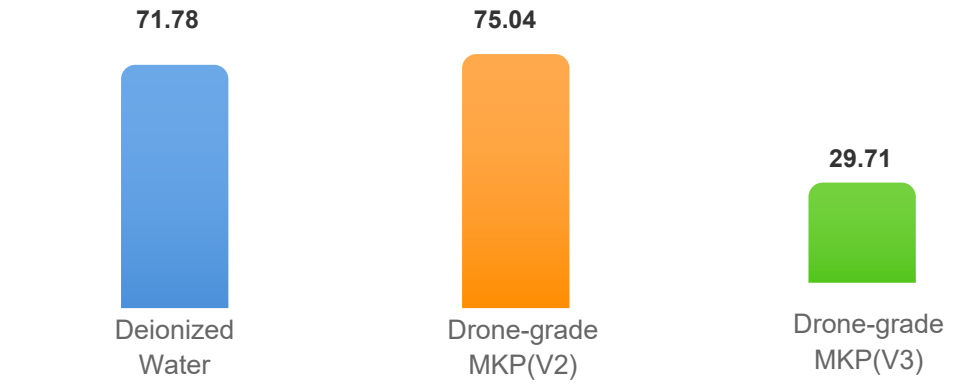
SECTION 09

How to Improve the Utilization of Drone Grade MKP - Surface Tension

Key Findings

- Drone-grade MKP (V2) solution surface tension is 75 mN/m, higher than deionized water
- Drone-grade MKP (V3) has low surface tension (below 30 mN/m)
- Lower surface tension increases the spreading area of droplets, improving fertilizer efficiency

Surface Tension Comparison Analysis Average (24x dilution)



Importance of Surface Tension

High surface tension causes droplets to form spheres on leaf surfaces, **reducing contact area** and making them easy to roll off.

Low surface tension allows droplets to **spread into thin films**, increasing the leaf contact area and improving nutrient absorption efficiency.

Surface Tension Reduction Effect

Deionized Water Surface Tension **71.78 mN/m**

Drone-grade MKP (V3) **29.71 mN/m**

Surface tension reduced by **58.6%**, significantly decreasing droplet contact angle on leaf surfaces.

SECTION 10

Contact Angle Analysis: Laboratory & Professional Testing

Contact Angle Comparison (°)

Crystal MKP	Glass: **103.96°** Leaf: **92.3°**
Drone-grade MKP (V2)	Glass: **114.3°** Leaf: **95.59°**
Drone-grade MKP (V3)	Glass: **97.36°** Leaf: **68.38°**

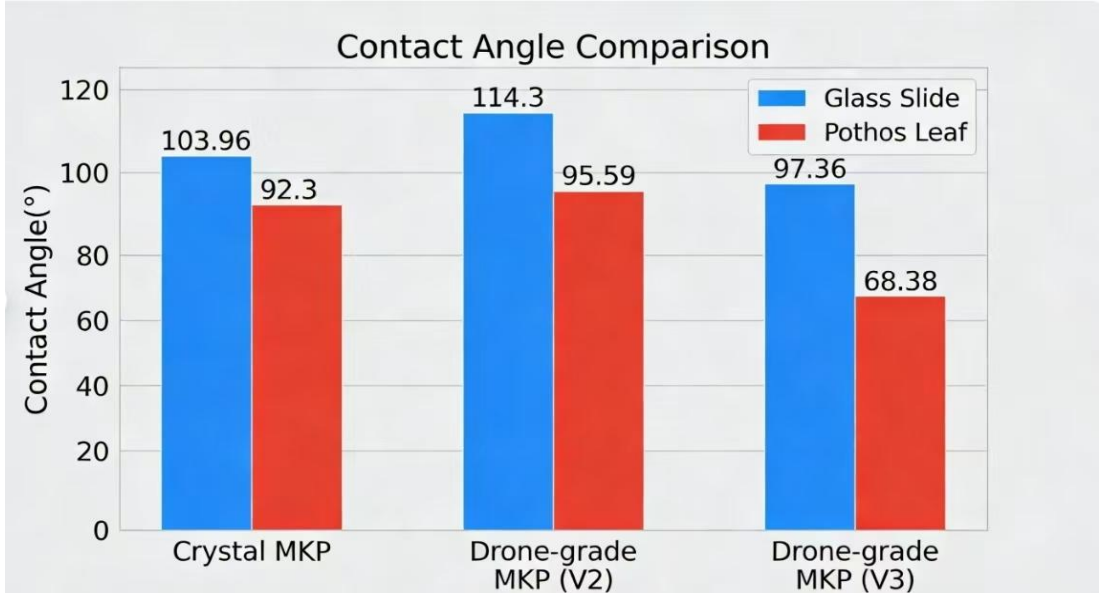
Professional Testing (China Agricultural University)

- **Fertilizer:Water Ratio:** 1:24
- **Surface:** Polystyrene petri dish
- **Measurement:** Take a photo and measure the contact angle every second, then observe how it changes from 0 to 9 seconds.
- **Error Range:** ±1°C

Key Finding

Drone-grade MKP (V3) shows **significantly lower contact angle** on leaves (68.38°), indicating **better wettability and adhesion** even on near-vertical surfaces.

Contact Angle Comparison Chart



Professional Test Results

Drone-grade MKP (V2)

104.67°

Drone-grade MKP (V3)

76.63°

Lower contact angle = Better spreading & adhesion

SECTION 11

Wetting Time Analysis: Dissolution Performance of MKP Fertilizer

Performance Summary

Drone-grade MKP (V2)

8.3s

Average Wetting Time

Drone-grade MKP (V3)

9.0s

Average Wetting Time

Time Difference: 0.7s (8.4% increase)

Test Conditions

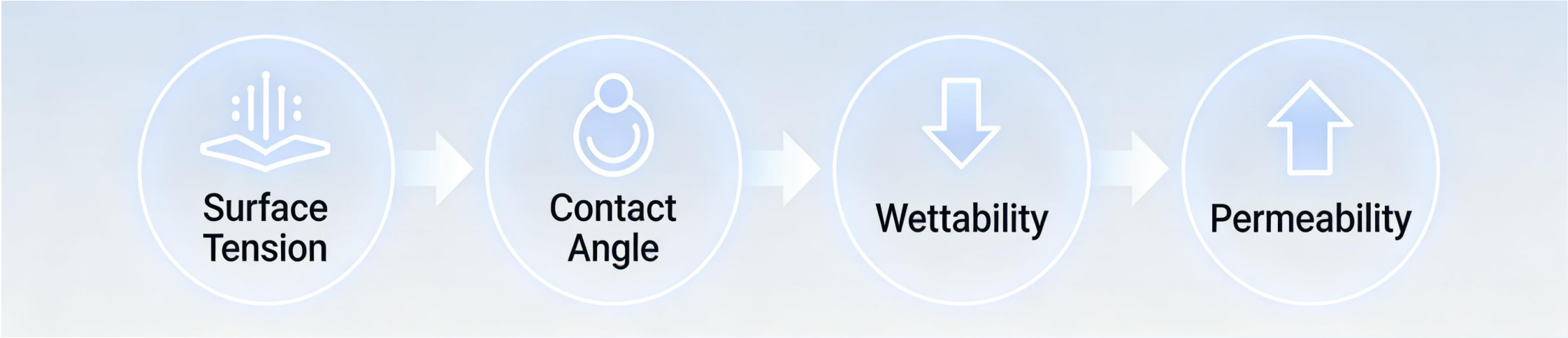
5g±0.1g	25℃±1℃	100mL±1mL
Sample Weight	Temperature	Hard Water

Test Conclusion

Both samples exhibit excellent dissolution performance. Drone-grade MKP (V2): **8 seconds**, Drone-grade MKP (V3): **9 seconds**. Both fertilizers demonstrate **good solubility** suitable for rapid application.

SECTION 12

How to Improve the Utilization of Drone Grade MKP - Permeability



Surface Tension ↓
(Internal Cause)

Surface tension is the internal force that makes liquids contract.

Contact Angle ↓
(External Manifestation)

The contact angle is the observable parameter that reflects wettability.

Wettability ↑
(Foundation)

Good wettability is necessary for achieving good permeability.

SECTION 13

Is Drone-Grade MKP Just a Finer Crystal line?

No!

Drone-Grade MKP is a **scientifically engineered formulation** specifically designed for UAV application environments. Its advantages extend far beyond particle size.

Controlled Impurity Level

Ultra-low impurity content ensures **consistent performance** and prevents nozzle corrosion or blockage.

Controlled Dissolution Rate

Engineered for **rapid and complete dissolution** within the UAV preparation window.

Controlled Insoluble Matter

Minimized insoluble content reduces sediment formation and nozzle clogging risk.

Optimized for UAV operation

The formulation is **specifically tested and validated** for **low-volume UAV spraying systems**.

The Engineering Difference

- Molecular-level formulation control
- Quality assurance throughout the entire production process
- Field-validated performance
- Continuous R&D optimization

SECTION 14

Other Products Available & Conclusion

Other Products

Agricultural Crystal MKP

Reliable solution for conventional fertilization programs

Foliar NPK Water-Soluble Fertilizers

Designed for soil and drip irrigation systems

Liquid Fertilizer Series

Designed for rapid nutrient absorption

Key Takeaway

Drone-grade MKP is **not just a marketing term**.

It is a **specifically formulation optimized** for UAV low-volume spraying systems, engineered to address the unique challenges of Drone foliar application.

Why Choose Drone-Grade MKP?

- faster dissolution
- Zero nozzle clogging
- Enhanced leaf retention
- Lower operational costs
- Field-validated performance

Drone-Grade MKP

Designed for UAV Application

Flash Dissolution

Nozzle Safe

High Retention