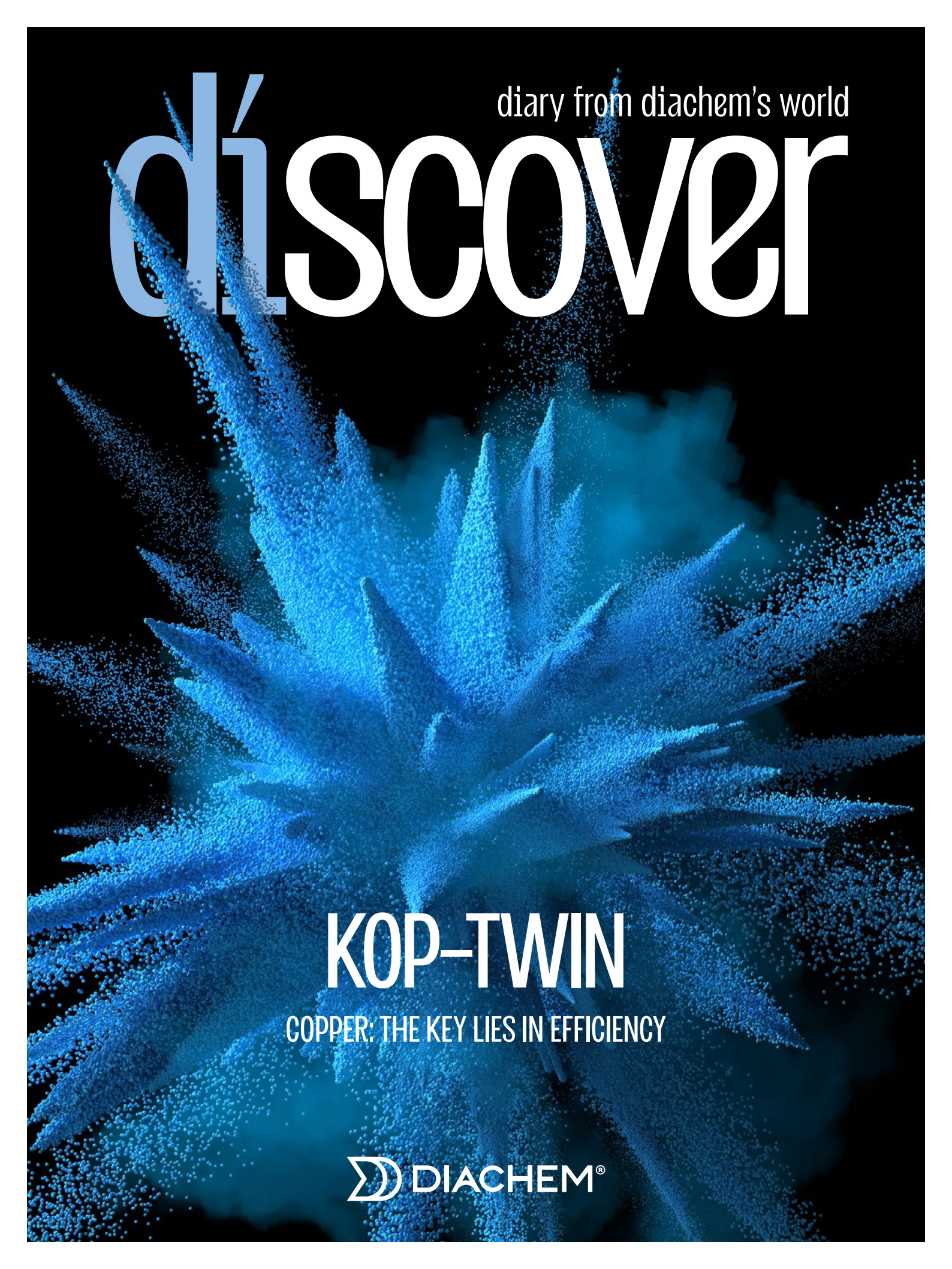




diary from diachem's world

discover

KOP-TWIN

COPPER: THE KEY LIES IN EFFICIENCY

 **DIACHEM®**



Copper, the key lies in efficiency

Copper is a cornerstone of crop protection, both in integrated and organic systems, owing to its efficacy in controlling numerous fungal diseases and its ancillary activity against bacterial pathogens

This same copper has long been at the center of attention of both the scientific community and regulators due to the environmental implications associated with its use in agriculture. However, its commercialization for agricultural use was extended in summer 2025 by the Ministry of Health until 30 June 2029, in accordance with EU Regulation 2025/1489. This represents a clear indication that, at the current state of knowledge, copper cannot be replaced by alternative active substances capable of providing the same benefits.

Advantages and limitations associated with copper use

Among the main advantages of copper as an active substance is its broad spectrum of activity. In particular, the following are well documented:

- › a primary activity against downy mildews, *Cercospora* spp., *Septoria* spp., pome fruit cankers, apple scab, peach leaf curl, shot hole disease, and olive leaf spot (peacock spot);

- › a secondary activity against rusts, *Alternaria* spp., *Stemphylium* spp., *Fusicoccum* spp., and *Cytospora* spp. an ancillary activity against *Monilinia* spp., powdery mildew, and *Botrytis* spp.;
- › a suppressive effect on several bacterial diseases.

Another advantage is the negligible risk of resistance development, associated with its non-specific (multi-site) mode of action at the level of the cell membrane and within the cell. For this reason, copper-based products are ideally suited for inclusion in anti-resistance crop protection strategies (see box on page 05).

Conversely, certain copper compounds may cause phytotoxic effects on some crops if used without appropriate precautions.

In addition, repeated applications over time may lead to copper accumulation in agricultural soils, exert toxic effects on soil microfauna, and consequently reduce biodiversity. For these reasons, the European Union has regulated its use-both in integrated and organic farming-under EU Regulation 1981/2018, which established a maximum limit of 28 kg/ha of copper over a 7-year period.

Copper at the center of market tensions

However, other critical issues concerning the use of copper in agriculture are not agronomic in nature.

Copper is, in fact, “competed for” by different industrial sectors, including electrification and the construction of data centers supporting artificial intelligence systems.

This market context has led to a significant increase in

demand for the material and, consequently, a sharp rise in prices, which increased by over 30% in 2025, reaching an all-time high in December and marking the largest annual increase since 2009.

Several analysts indicate the possibility that, as early as 2026, a structural global shortage of copper may begin to emerge. This therefore calls for careful consideration: if, on the one hand, current legislation imposes well-defined quantitative limits on the use of copper in agriculture, and on the other hand there is a real risk of reduced availability of copper for the primary sector in the short to medium term, what should the focus be in order to avoid giving up the phytosanitary benefits of this active substance? The answer lies in maximizing the efficiency of applied copper.

TBCS Inside, copper according to Diachem

Diachem's long-standing experience in the copper-based formulation segment shows that the copper salt capable of achieving the best balance between rapid activity, persistence of action, and crop selec-

Copper-based products (King® 360 HP shown in the photo) during quality control procedures in the Diachem laboratory.





TBCS Inside - The logo featured on the label identifying Diachem-branded products containing Tribasic Copper Sulphate (TBCS).

tivity is Tribasic Copper Sulphate (TBCS), obtained through the reaction between copper sulphate and ammonium hydroxide, yielding a neutral pH solution. Diachem has placed strong confidence in TBCS, to the point of developing a product line based on it, named "TBCS Inside". This includes, for example, the fungicide **King® 360 HP**, which, with its 24% metallic copper derived from tribasic copper sulphate (360 g/L), is effective against a broad spectrum of fungal diseases affecting both tree crops (including wound pathogens) and herbaceous crops and also exhibits bacteriostatic activity

Kop-Twin, the power and balance of "different twins"

The broad spectrum of activity, in terms of target pathogens and registered crops, also applies to **Kop-Twin®**, another protectant fungicide within the TBCS Inside line.



Kop-Twin - Different twins, one heart.

THERE'S COPPER AND COPPER: READINESS TO ACT VS PERSISTENCE

All copper-based products used in agriculture (copper hydroxide, copper oxychloride, cuprous oxide, Bordeaux mixture, and tribasic copper sulphate) owe their efficacy to the Cu^{2+} ion, which exerts a toxic effect on the spores of numerous phytopathogenic fungi. Copper-based plant protection, all classifiable as protectant products, is therefore preventive in nature, and treatment efficacy depends on the fact that at the

time of fungal spore germination, enough copper ions are available for uptake within the thin liquid film covering the vegetation. The solubilisation of these ions depends both on the formulated product applied and on the environmental conditions at the time of treatment (humidity, radiation intensity, etc.). Rapid release of copper ions enhances promptness of action, whereas a slower

release results in greater persistence of activity. From this perspective, copper-based products exhibit different characteristics: while copper hydroxide stands out for its rapidity of action, Bordeaux mixture is characterized by lower promptness but greater persistence. Similarly, in tribasic copper sulphate, part of the copper is rapidly bioavailable, whereas another fraction is released more slowly.

Kop-Twin® features, however, a highly distinctive characteristic that makes it a unique product: its formulation is based on the original combination of tribasic copper sulphate (13.3%, 180 g/L), which expresses the optimal balance between rapidity of action, persistence, and selectivity, and copper hydroxide (8.9%, 120 g/L), which provides a “boost” to rapid activity.

The optimal balance between these two different copper salts ensures an adequate supply of metallic

copper per hectare while maintaining high levels of efficacy. At the same time, the solvent-free liquid formulation and its adhesive properties allow optimisation of the particle size distribution in suspension, ensuring uniform coverage of the treated vegetation.

Kop-Twin® is the perfect answer to the need to maximise the efficacy of copper treatments at reduced application rates.

COMPOSITION	Metal copper 22,2% (300 g/l) - from Tribasic Copper Sulphate 13,3% (180 g/l) + hydroxide 8,9% (120 g/l)
REGISTRATION OF ITALIAN MINISTRY OF HEALTH	No. 11779 dated 26.10.2005
HAZARDS INDICATIONS	Warning H319; H410; EUH401
FORMULATION	Suspension concentrate (SC). Not coloured formulation
FIELDS OF APPLICATION AND DOSES (ml/ha)	Grape (200-250), Vegetables in the label (200-250), Olive (250-300), Potato (250), Strawberry (250), Asparagus after harvesting (200-250), Pome fruits (100-200), Hazelnut (350), Walnut (350), Tobacco (250), Flowers and ornamentals (200). Autumn-winter treatments (before vegetative renewal): Pome fruits (300-480), Stone fruits (420-480), Citrus (250-300), Kiwi (360-420), Hazelnut (540). For further details and mode of application see the label
PACKAGING	1 lt bottle (carton box 10 pcs) - 5 lt can (carton box 4 pcs), 10 lt can (single)

For more information on the products:



KING® 360 HP

Plant protection product authorized by the Ministry of Health containing tribasic copper sulphate (Reg. No. 12738 dated 18/03/2008). Use plant protection products with caution. Always read the label and product information before use. Pay attention to hazard statements.



KOP-TWIN®

Plant protection product authorized by the Ministry of Health containing copper in the form of tribasic copper sulphate and copper hydroxide (Reg. No. 11779 dated 26/10/2005). Use plant protection products with caution. Always read the label and product information before use. Pay attention to hazard statements.



Kop-Twin

Different twins, one heart.



**The balance of
tribasic copper
sulphate, the
rapidity of copper
hydroxide.**



Scan the QR code
and discover Kop-Twin®

diachemagro.com



DIACHEM®
We embrace agriculture

Fatti di Terra.

Diachem's Podcast
on the challenges of agriculture



LISTEN, COMMENT, SHARE!

Fatti di Terra is online on all major music platforms



Listen on
Apple Music



Listen on
Spotify

LISTEN ON

amazonmusic



Listen on

YouTube Music



**fatti
di terra**

VOCI DAL MONDO
DELL'AGRICOLTURA



we embrace agriculture

For over 70 years, we have been an Italian, family-owned company evolving alongside agriculture. Our mission is to create sustainable solutions for today's and tomorrow's agriculture. For this reason, we support farmers in their daily challenges, promoting more productive crops while respecting nature, and contributing to food security through continuous investment in research and innovation.

Improving and growing stronger, together, every day.



diachemagro.com



 **DIACHEM[®]**