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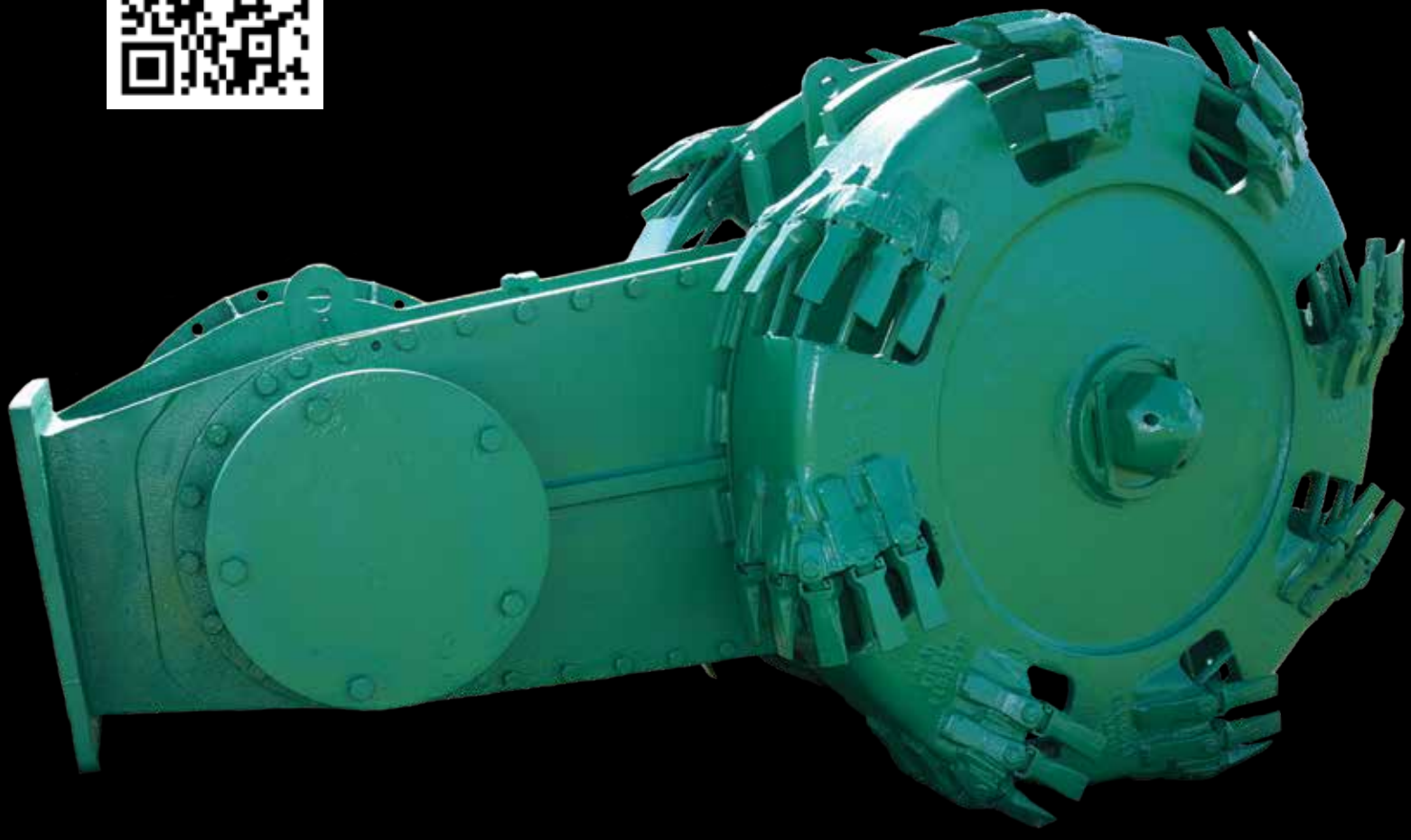

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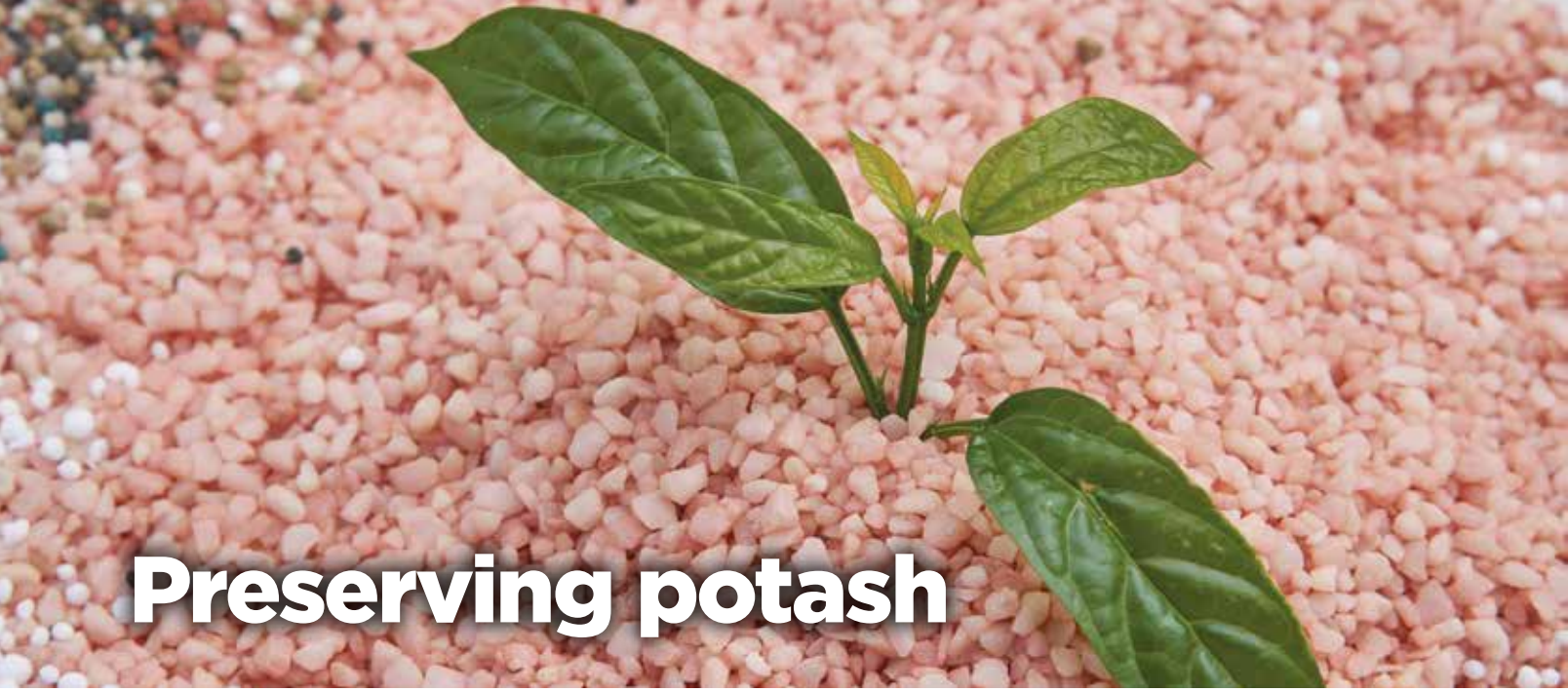
Coating solutions for potash fertilizer storage and transport



Preserving potash

COATING SOLUTIONS FOR POTASH FERTILIZER STORAGE AND TRANSPORT

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Annually, millions of tons of potash fertilizer products are exported globally, necessitating intricate logistics for transport and storage. This operation encompasses prolonged storage of potash within facilities and transfer under non-controlled environmental conditions. Bulk potash transport primarily leverages rail cars and maritime vessels in combination with conveyor belts.

One prevalent issue during conventional storage and transportation is the frequent occurrence of potash fertilizer agglomeration, often referred to as “caking”. Caking arises primarily due to cyclical fluctuations in humidity, influenced by day-to-night temperature changes. When humidity increases, moisture either condenses from the air or migrates out of the granules, initiating the dissolution of the fertilizer. Conversely, as humidity decreases and temperatures cool, re-crystallization leads to the formation of crystal bridges, creating salt bonds that bind granules together. These lumps and agglomerates typically form in fertilizer storage facilities or because of exposure to harsh environmental conditions during transit. The existence of solid clumps within the fertilizer adds complexity to the handling process during loading and transit. Furthermore, these lumps can impede equipment spreading, leading to uneven nutrient distribution and increased wear on the equipment.

In addition, the agglomerated fertilizer tends to generate dust during packaging or transportation due to the mechanical abrasion caused by the movement of the fertilizer particles and/or the migration of moisture through the fertilizer. This dust complicates handling and land distribution, as it can become airborne during application in the field. Consequently, it leads to uneven nutrient distribution and potential health and safety concerns for users.

It is important to note that the phenomenon of moisture accumulation within bulk potash occurs at the air-potash interface throughout various stages, commencing with mining processing and persisting until the final application of potash to the soil in conjunction with other fertilizers and additives. Figure 1 illustrates the effect of standard potash (KCl) fertilizer after exposure to 85 per cent RH at 30°C for eight hours.

Although various methods can be adopted to address these challenges, applying a protective coating on granular fertilizers emerges as an effective strategy.

Figure (1): Potash (KCl) fertilizer before and after exposure to 85 per cent RH at 30°C for eight hours x25 magnification.

Before.

After.

Table (1): Comparison of moisture absorption behaviour.

Sample Description	(RH%)		
	75%	80%	85%
Moisture gain (%) uncoated potash	4.30	9.20	16.50
Moisture gain (%) GALORYL® coated potash	2.03	5.60	11.50
Average percentage reduction in moisture uptake for Galoryl coated versus uncoated potash	52%	39%	33%

Figure 2: Comparison of caking reduction behaviour.

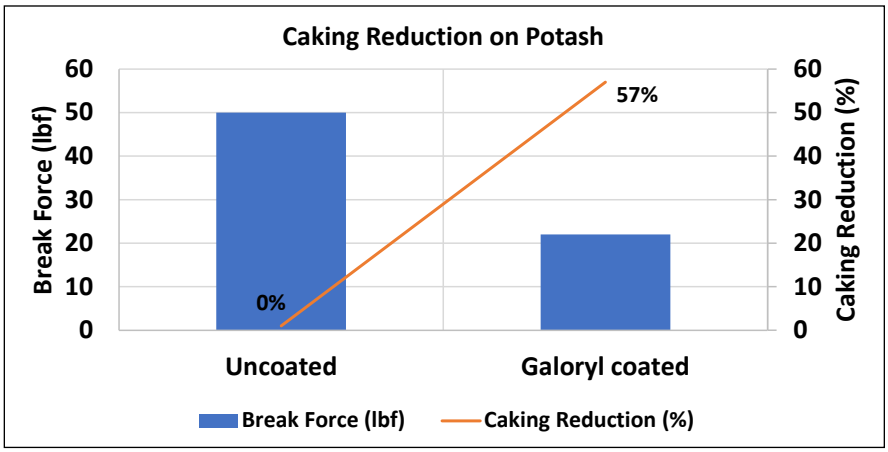
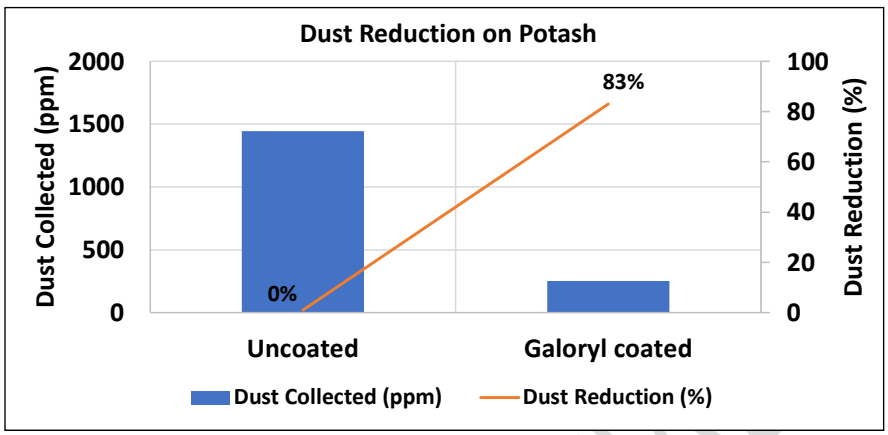


Figure 3: Comparison of dust reduction behaviour.



In this context, the coating serves as a barrier layer, preventing the adsorption and/or ingress of moisture from the environment into the potash fertilizer and vice versa.

Arkema offers a variety of coatings under the GALORYL® product line that provide significant anti-caking and dust control properties for a range of granular fertilizers, including potash. Table 1 compares the moisture absorption behaviour of an uncoated potash to that of a GALORYL® coated potash fertilizer. Notably, the data shows a significant reduction in moisture absorption at high relative humidity (RH%) when the fertilizer is coated with GALORYL® and maintained at 30°C.

To understand the improvement in caking reduction performance, an accelerated caking test is performed on coated potash fertilizers to simulate surface caking of fertilizer piles stored in warehouses. The plot in Figure 2 clearly illustrates the superior anti-caking performance of the coated potash in comparison to the uncoated material. For instance, the force energy required to break a GALORYL® coated potash cake is 57 per cent lower than that of uncoated potash. These large improvements in caking reduction help protect the fertilizers from clumping, and the low break force provides convenient handling from manufacturing to field application.

In addition to the anti-caking behaviour, the coated fertilizers provide short-term dust reduction properties to the fertilizers. The plot in Figure 3 compares the dust reduction performance

of the coated potash fertilizers to the uncoated material. The GALORYL® coated potash shows an 83 per cent reduction in dust compared to uncoated potash. From the graph, it is evident that the dust reduction performances of the coated potash fertilizers are superior in comparison to the uncoated potash. The better dust control behaviour of the coated fertilizers results in minimal loss of fertilizers for more sustainable farming.

In conclusion, the Arkema GALORYL® coatings provide a reliable barrier that enhances moisture resistance and reduces the caking and dusting behaviour in potash fertilizers. This ensures smooth storage and transport of potash fertilizers in challenging environmental conditions without compromising their ultimate field performance.

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