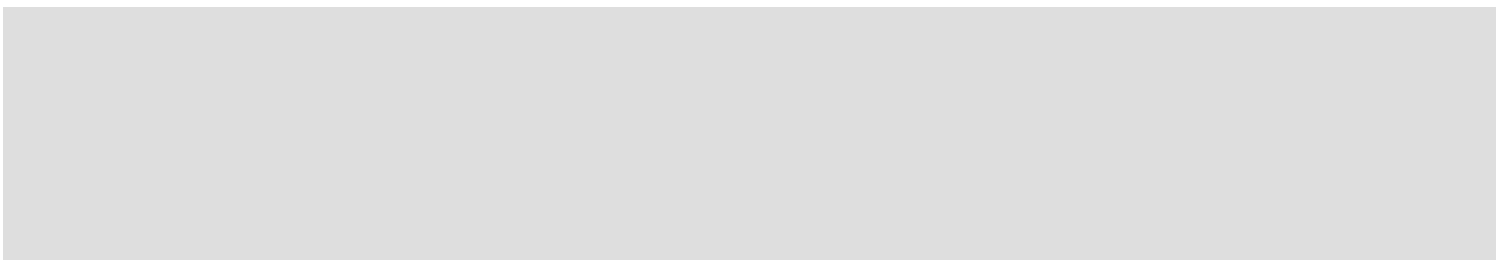




VSP Clino Turf

Zeolite-Clinoptilolite Soil Amendment for
Golf Courses and Sports Turfs



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Zeolite-Clinoptilolite Soil Amendment

What is Zeolite?

Zeolites are hydrated aluminosilicate minerals containing aluminium, silicon and oxygen in their regular framework. They form naturally as a result of a chemical reaction between volcanic lava and saline water.

Properties of Zeolite

Zeolites have large open spaces (or cages) in their structure that form channels. These channels allow ions and molecules to easily pass in and out of the structure. This ability puts zeolites in the class of materials known as "molecular sieves".

In agriculture, zeolites are used to promote better plant growth by improving the effect of fertilisers. Zeolites can retain both nutrients and water in their porous structure and then release them in a controlled manner. This means that the plants always have a captured reservoir of both water and nutrients readily available, in the soil, to draw upon. The combination of these effects therefore reduces the overall amount of irrigation and fertiliser needed, because less water is lost due to infiltration and evaporation, and less fertiliser is lost due to leakage.

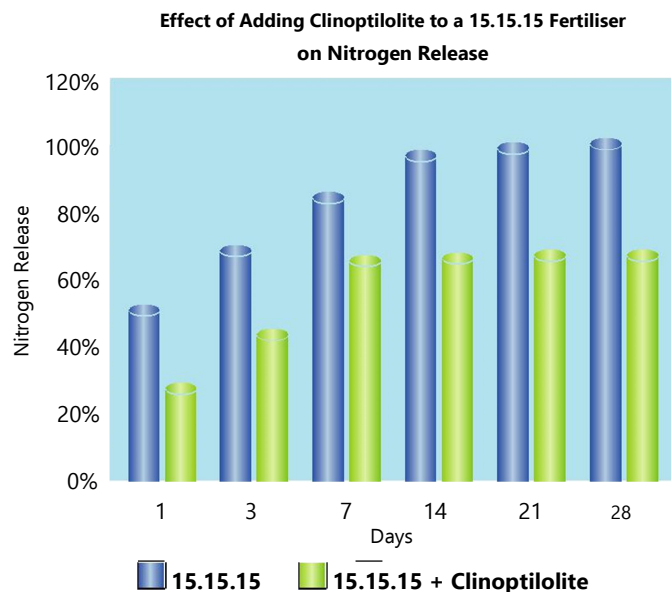
Benefits of Zeolites as Soil Amendments

- Enhances the cation exchange capacity of soil
- Reduces the amount of water needed for cultivation
- Prevents formation of the duff layer
- Stores nutritional elements and water, releasing them gradually depending on plant's needs
- Enables balanced nutrition uptake
- Prevents root decay
- Removes heavy metals and toxin contamination

Scientific Study:

The Efficiency of Zeolite-Clinoptilolite as a Soil Conditioner in Acidic and Alkaline Soils

- Addition of Clinoptilolite to mixtures of either acidic or alkaline soils with specific fertilisers has a major effect on the slow release of nutrients (nitrogen, phosphorus, potassium and sulfur), enabling these nutrients to be available for longer periods.
- Clinoptilolite retains a significant amount of water due to its porous structure.
- Due to its high Cation Exchange Capacity, Clinoptilolite activates the soil.



What will VSP Clino Turf do for Golf Courses and Sports Turfs?

VSP Clino Turf is a zeolite-clinoptilolite soil amendment that improves the properties of soil and supports turf growth. With its high cation exchange capacity, superb water retention abilities and adsorption properties, VSP Clino Turf not only improves the water regime of the soil, but also prevents the wash-off of the essential micro- and macro-nutrients.

Use for sports turfs, golf greens, tees and fairways, landscaping, horticultural crops, lawns and gardens, etc. VSP Clino Turf particles have uniform size and round shape. Therefore, when applied, unlike other jagged edged types of zeolite, they will not damage your turf in any way whatsoever!

Particularly effective, when mixed into sandy and coarse-textured soils.

VSP Clino Turf can be used as an excellent slow-release fertilizer additive that provides an efficient management of nitrogen (N), phosphorus (P), potassium (K) and sulfur (S).

Application of VSP Clino Turf

1. New Constructions

The minimum application rate is 5% by volume; however, the best results will be achieved at rates of 10 - 15%. VSP Clino Turf should be mixed with sand prior to the application.

2. Existing Sports Turfs

Best results will be achieved when VSP Clino Turf is incorporated into the rootzone at a rate of 100-250 kg per 100 m².

3. Sample Calculation

A sample calculation is given below for top-dressing a sports ground with VSP Clino Turf with a rootzone depth of 10 cm.

Rootzone Depth	Application Rate	Quantity kg/m ²
10 cm	5%	4,5
	10%	9,0
	15%	13,5



Physical Properties

Form	: Solid
Colour	: White, whitish beige
Odour	: None
Moisture	: Max. 12%.
Size	: 0,5 - 1mm; 0,5 - 1,5mm and many other sizes.
Specific Gravity	: 1,9 - 2,1 g/cm ³
Bulk Density	: 0,80 - 0,90 g/cm ³
Solubility in Water	: Insoluble
Surface Area (BET)	: 40 - 44 m ² /g
Water Retention Capacity	: 65 - 75% (w/w)
Cation Exchange Capacity	: 1,6 - 2,0 meq/g (NH ₄ ⁺ Kjeldahl method)
Thermal Stability	: up to 840°C

Chemical Composition*

Determination by XRF (DIN 51001)

	w/w %
SiO ₂	68,80
Al ₂ O ₃	14,60
Fe ₂ O ₃	0,91
TiO ₂	0,08
CaO	2,57
MgO	0,63
Na ₂ O	0,72
K ₂ O	3,43
SiO ₂ /Al ₂ O ₃	4,70

* Average values.



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