EXPERTS FOR GROWTH

COMPO EXPERT®

Improvement of stress tolerance in turf

Fig. 1: **Advanced grennkeeping measures reduce heat and drought stress**

Recommendations for the promotion of heat and drought tolerance for turf

Native cold zone grasses are well adapted to a central European climate. Due to increasing global warming and associated climate changes, we will have to cope with periods of high temperature and low rainfall. Heat and drought stress can effect grasses and thus have a negative impact on the performance of sports turf.

In contrast to warm zone grasses which are well adapted to varying climates, cold zone grasses only tolerate a relatively low temperature range. It is important to condition grasses using targeted treatments, thereby increasing their tolerance to heat and drought stress.

Fig. 2: **Dry stress symptoms on a golf green**

Tab. 1: **Critical points of temperature**

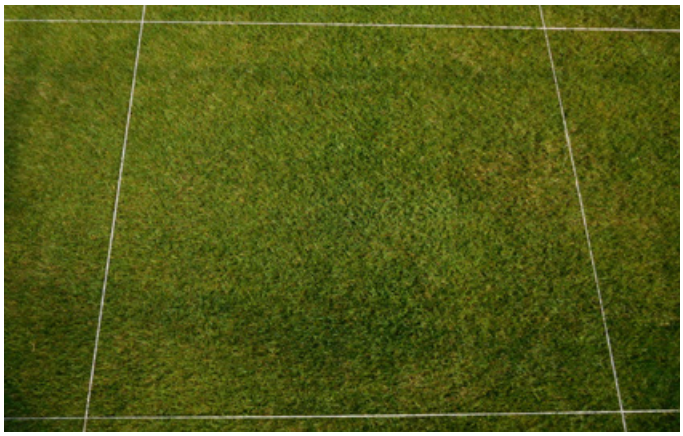
	cold zone grasses	warm zone grasses
Optimal ranges		
Shoot growth	18–24 °C	27–35 °C
Root growth	10–18 °C	24–29 °C
Critical areas		
Air temperature	> 30 °C	> 36 °C
Soil temperature	> 23 °C	> 29 °C

Grass reactions to heat and drought stress:

- Root flattening
- Leaf necrosis
- Reduced photosynthate activity
- Increased respiration: more Carbohydate consumption

Fig. 3: **Only basic fertilization under drought stress (25% irrigation)**

Fig. 4: **With additional Kali Gazon fertilization, NK ratio 1:3 under drought stress (25% irrigation)**



Potassium and Silicone increase the drought stress tolerance

Many publications clearly demonstrate that potassium and silicone applications significantly increase drought stress, tolerance and a reduction in heat and drought correlated turf damage. Potassium optimises the water balance within the plant, reduces ineffective transpiration and promotes the resistance and regeneration of turf grass during summer weeks.

For turf vitalization and preparation for drought and heat stress, additional Potassium applications with e.g. **Kali Gazon, Floranid® Twin Eagle K** or **Floranid® Twin Club** can be recommended. Typical dry spot symptoms, so-called Localized Dry Spots (LDS) and leaf necrosis can be significantly reduced by timely application of potassium (Fig. 5 and Fig. 6).
Potassium also supports regeneration after drying damage has already occurred in most grass species.

Kali Gazon

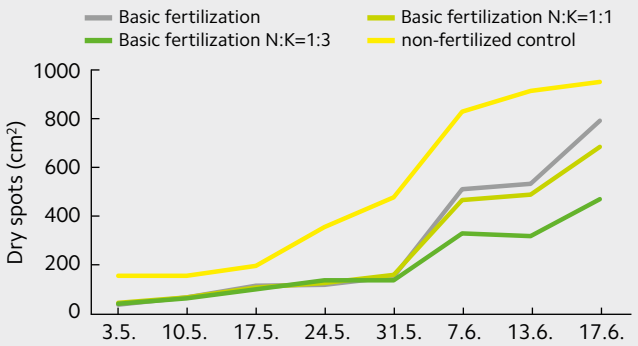
EC FERTILIZER
Potassium sulfate with magnesium and sulfur 27(+10+17).

Declaration:

27 %	K_2O	water soluble potassium oxide
10 %	MgO	total magnesium oxide 10% water soluble magnesium oxide
17 %	S	total sulfur 17,0 % water soluble sulfur

Form of delivery: 25 kg big bag

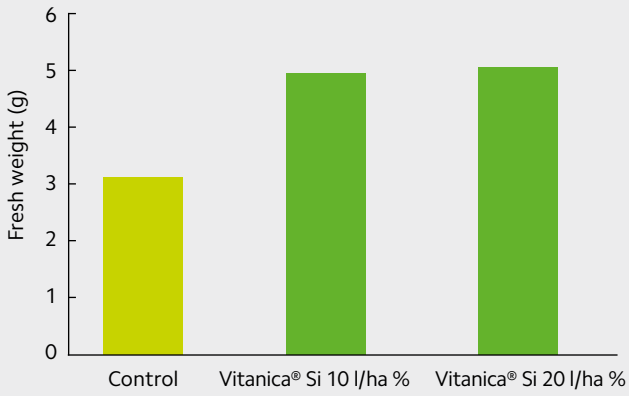
Fig. 5: **Influence of potassium on the tolerance to dryness**
Test parameters: Dry spots



Basic fertilizer: Floranid® Twin Turf
Potassium fertilizer: Kali Gazon

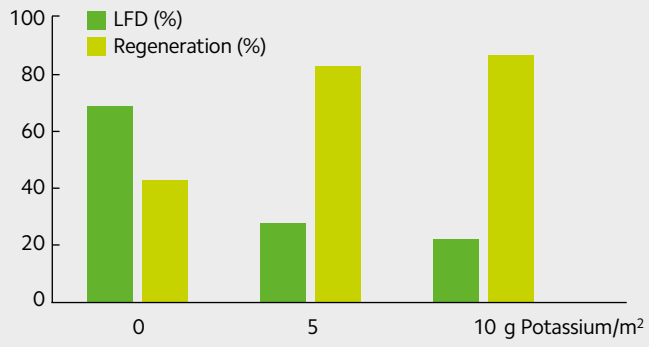
LANDLAB Turf Research Station, Vicenza, Italy, 2016

Fig. 7: **Influence of silicone on drought stress tolerance of grasses**



Graphic: Dr. Fritz Lord, Global Crop Manager Turf COMPO EXPERT, Münster, 2016

Fig. 6: **Influence of potassium on the tolerance to dryness**
Test parameters: Leaf damage (LFD) and regeneration



According to: Fry & Huang, 2004

Turf grass can preferentially absorb and store silicone. Silicone is not an essential nutrient, but it plays an key role in the heat and drought stress physiology of plants, by strengthening the cell walls and initiating complex plant defence processes.
Several trials at COMPO EXPERT Research & Development Centre confirm that applications of Vitanica® Si can change the wilting point of turf and will help turf grasses to survive extreme temperatures (Fig. 7).
Repeated applications with low concentration (10 l/ha) are sustainably more effective than one highly concentrated single application.

Algae extracts for grass vitalization and mitigation of abiotic stress factors

3–4 applications of 10–20 l/ha Vitanica® algae extracts have proven in practice to be excellent, especially during the summer at intervals of about 3 weeks. The algae extracts from the sea weed *Ecklonia maxima* are produced in a gentle cold process and containing therefore a high concentration of bioactive ingredients, such as e.g. antioxidants responsible for heat tolerance. Depending on the target, different formulations are available. The Vitanica®-products can be combined with 0.5–1 l Kick® Wetting Agent Concentrate/ha to improve the absorption of nutrients and active ingredients, especially in the case of dry weather.

Effects of Vitanica® sea weed extracts

- Increase of the anti-stress hormone Cytokinin
- Improvement of photosynthesis performance
- Increase of carbohydrate storage = Depot for increased stress-related consumption
- Increase of antioxidants and thus protection from photooxidative stress
- Promotion of root growth
- Grass stabilization

Vitanica® P³ Liquid NK fertilizer with seaweed extract for foliar application in high-quality turf grass.

Vitanica® RZ Organic-mineral NK fertilizer with seaweed extract and *Bacillus amyloliquefaciens*, selection R6-CDX®, for plant vitalization and promotion of healthy root growth.

Vitanica® Si Liquid organic-mineral NPK fertilizer based on algea extracts (*Ecklonia maxima*) with silicate. For preparation of fine tournament golf greens.

Vitanica® MC Organic-mineral NPK fertilizer with trace elements based on seaweed extract from *Ecklonia maxima* for leaf and soil fertilization on greens, tees, fairways and sports fields.

Kick®

Liquid wetting agent concentrate for the acute and preventive treatment of dry spots on lawns and for dew control. Also suitable as a wetting agent when liquid fertilizers are used.

Form of delivery: 2,5 l canister

Kick® LDS

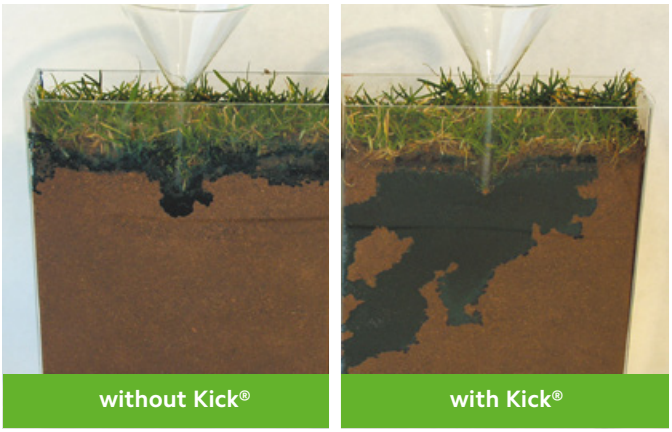
Liquid wetting agent with high effectiveness against acute dry spots (local dry spots) on lawns. Kick® LDS promotes water absorption capacity and uniform water distribution in hydrophobic locations, thus minimising drought damage to grasses and improvement of regeneration growth.

Form of delivery: 10 l canister

Wetting agents optimize the irrigation management

The use of wetting agents during the summer is an important measure in sustainable turf maintenance to avoid drought stress damages. Kick® Wetting Agent Concentrate and Kick® LDS ensure a homogeneous distribution and penetration of water even in hydrophobic soil conditions. Irrigation water does not run off ineffectively but spreads evenly horizontally and vertically in the ground (Fig. 8). The degree of utilisation of any irrigation system is considerably and thus saves water.
Kick® Wetting Agent Concentrate is generally used preventively with 2.5 l/ha from May/June on. Kick® LDS is especially suitable for the curative treatment of existing severe Localized Dry Spots (LDS) with 10–20 l/ha.

Fig. 8: **Promotion of water distribution in the turf base layer**



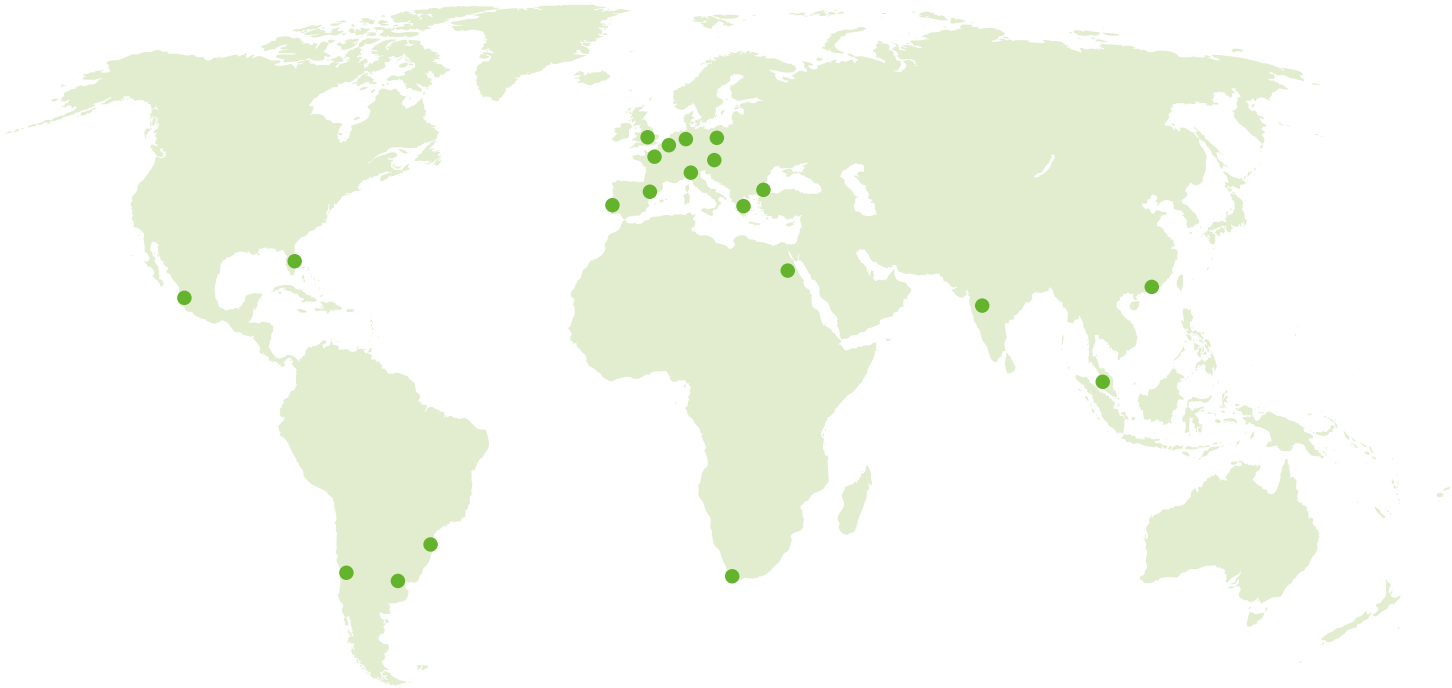
Vital measures to improve the drought and heat tolerance in turf grass:

- Potasium fertilization from June (e.g. Kali Gazon 20–25 g/m^2)
- Preventive use of Kick® Wetting Agent Concentrate
- For regeneration of acute dry spots application of Kick® LDS; 2 x 10 l/ha at intervals of 4 weeks
- Turf Grass vitalization during the summer with 10–20 l/ha Vitanica® RZ or Vitanica® P^3 every 3 weeks (also in mixtures).
- Before extreme heat periods and tournaments treat Greens with Vitanica® Si (10 l/ha)
- Irrigate at noon time for air-conditioning (cooling down the turf) during high heat periods

For detailed recommendations please contact your local dealer/agent.

COMPO EXPERT

Turf competence around the world



Sports Turf

Golf Turf

Public Green

Landscaping

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