

PARADOXES ABOUT LIQUID VERSUS GRANULAR FERTILIZERS

Separating fact from fiction

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Many wrong statements are vehicles for sales of liquid fertilizers due to a lack of information on the difference and / or similarity between liquid versus granular fertilizers. We selected very few paradoxes and commented them impartially.

Paradox 1: Liquid fertilizers acidify the soil less than granular fertilizers.

Answer: wrong.

Paradox 2: Granular fertilizers stimulate a rapid growth while liquid fertilizers provide a uniform, less rapid growth.

Answer: wrong.

Paradox 3: Liquid phosphorus is entirely water soluble and fully available to turf.

Answer: The granular phosphorus is also entirely water soluble even if it is in granular form. On the other hand, liquid phosphorus that is entirely water soluble does not mean that it is entirely available to turf. In other words, the expression **entirely soluble** is not synonymous to **entirely available** to plant.

In general, phosphorus availability (liquid or granular) to plants is 10 to 30% of the total phosphorus application. Nitrogen availability is 50 to 75% while that of potassium is 35 to 60% under the best climatic, edaphic and plant conditions. What about the remaining percentages of nitrogen, phosphorus and potassium that will not be available to plants? The answer to this question needs several pages of explanation. Lack of space does not allow us to elaborate.

Paradox 4: Liquid fertilization is more efficient than granular fertilization because it provides water to turf under warm and dry conditions.

Answer: This statement is wrong. Liquid fertilization is usually sprayed at the rate of 10 to 15 litres of water per 100 m² when in fact turf needs 2 to 5 cm per 100 m² of water per week under warm and dry conditions. Therefore, the amount of water used in liquid fertilization is insufficient to satisfy the need of turf for water. Moreover, under warm and dry conditions, turfgrass metabolism slows down and does not absorb enough water from the liquid fertilizer that evaporates more than it can be absorbed by leaves.

In general, a major portion of the liquid nitrogen is derived from urea that, after spray, is transformed to ammonia (NH₃) causing burns (depending on the dosage) to foliar tissues when it dries on the leaves. Therefore, it is always useful to moderately irrigate immediately after liquid fertilizer spray to leach from leaves the urea residues.

Paradox 5: Liquid fertilizers eliminate turf burns caused by granular fertilizers.

Answer: When applying the same rates, at the same concentration of slow-release nitrogen, on the same day, to the same turf, if there is any fertilizer burn, the one from the liquid fertilizer will be similar to that from the granular fertilizer.

Paradox 6: Liquid fertilizers can be mixed to prescription to fill the precise turfgrass need for nutrients.

Answer: This statement is true for granular fertilizers too.

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Paradox 7: Nutrient leaching is reduced when using a liquid fertilizer compared to a granular fertilizer.

Answer: This statement is wrong because leaching losses of liquid fertilizer are similar to those of granular fertilizer if the liquid and the granular materials used have similar reactions.

Paradox 8: All liquid fertilization is absorbed immediately through turfgrass foliage where photosynthesis takes place.

Answer: This statement is not true because a small amount of sprayed liquid fertilizers NPK is absorbed through the foliage. A second amount (such as urea) may volatilize. A third one may dry out on the foliage and be washed down with irrigation (rain) to behave like a granular fertilizer (i.e. absorbed by roots, leached and / or fixed to the soil and organic matter). However, liquid fertilizers cost more than granular fertilizers if one scientifically compares N-P-K kg / 100m² / application rather than erroneously compares liquid 10-2-6 versus granular 10-2-6 fertilizers. Depending on the form of applied nutrient, the granular fertilizer is absorbed very shortly after liquid fertilizer. Therefore, this very small amount of liquid fertilizer absorbed by leaves does not make an agronomic difference with the granular fertilizer.

Paradox 9: Turfgrass mower picks up the granular fertilizer pellets while liquid fertilizers are not picked up in the mower's basket.

Answer: This statement is very wrong because part of the liquid fertilizer remains on or in turf leaves and is picked up in the mower's basket too.
According to Western Fertilizer Handbook, published by California Fertilizer Association (second horticulture edition, 1998): "Research shows that up to 50% of the nitrogen may be taken up within 60 minutes or less and that over 90% of the nitrogen may be taken up and utilized within 24 hours."

Paradox 10: Materials of granular fertilizers may segregate while those of liquid fertilizers are in a homogenous solution.

Answer: The segregation of materials while broadcasting a granular fertilizer can be minimized and becomes agronomically insignificant if:

- a) The fertilizer manufacturer uses materials of homogenous granular size.
- b) The granular fertilizer is bagged at the fertilizer plant.
- c) The fertilizer spreader is of average wear. Note that plugged nozzles can also result in non-uniform sprays.

The most important point to make is that application of the same rate (in liquid or granular form) produces similar responses on plant physiology if the materials of the liquid fertilizer are similar to those of the granular fertilizer, example: liquid urea versus granular urea. Therefore, the difference between liquid or granular fertilizers is agronomically insignificant to justify the preference of using one form at the expense of the other. Do not compare a liquid application of 0.25 kg N / 100 m² releasing over six weeks with that of a granular fertilizer releasing over 16 weeks.

The slow-release nitrogen materials in granular form release over a longer period of time than those of liquid slow-release nitrogen.

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Paradox 11: Injection of liquid fertilizers in the irrigation system at very low but frequent rates is preferred.

Answer: No irrigation system can evenly (100%) distribute water on the irrigated turf area. To prove it, place several cans in the irrigated zone and irrigate for some time. Then measure in millilitres the amount of water in each can. Do all the cans contain the same amount of water? Moreover, the irrigation pattern is highly irregular when windy.

Paradox 12: Some golf course superintendents use only liquid fertilizers.

Answer: Have these superintendents made comparative field evaluations between liquid and granular fertilizers **on the same** green or tee or fairway in view of the yearly cost? Have you checked the nutritional equilibrium in their soils and turfgrass leaves? We are not sure they use anything but liquid fertilizers! In fact, to some superintendents, the liquid and the granular fertilizers make the yearly fertilizer programme.

Conclusion: Which one to choose, the liquid or granular fertilizer?

Answer: It all depends upon the expected results, the nutrients to be added, soil fertility, turfgrass physiology, climatic conditions, budget, ease of application...Our goal is to throw light on these paradoxes, it is then up to you to choose the appropriate form based on cost and results.