Around the world, billions of pounds of corn are planted and grown for the purpose of feeding livestock. For many dairy farmers, corn (coming from both grain and silage) supplies a significant amount of calories in milk cow and heifer diets. Corn (often referred to as maize outside of the U.S.) has the distinction of providing the most calories per acre of ground than any other crop grown on the planet.

Due to the widespread use of corn in both animal and human diets, corn is the most widely grown plant used for food in the U.S., beating out both wheat and soybeans. Due to a nearly insatiable need for corn and corn products, a massive industry has developed for the sole purpose of developing hybrids that can be grown in a variety of environmental conditions.

It’s probably fair to say agribusiness has become obsessed over the past decades with maximizing how much corn can be grown on an acre of ground. According to USDA data, the bushel yield per acre of corn has increased by more than a factor of five since the 1930s. Significant gains were initially made with the advent of commercial fertilizer in the 1950s. Starting in the 1960s, improved cropping practices and hybridization have added to the yield as well. Few dairy farmers can manage high milk production from their cows without some inclusion of corn in the diets. Many of those dairy farmers raise their own corn crop to be harvested as silage or high-moisture corn. Others grow it for the grain and produce corn meal on the farm.

The life of a corn plant must begin in the soil. Regardless of the choice of hybrid or the improvement of farming practices, healthy, well-structured soil is critical to the successful growth of a crop of corn. Soil quality is an indispensable part of corn production, quality and tonnage.

The two most important components of soil quality and how well it may or may not support a crop of corn is the moisture content in the soil and the pH level. No variety of corn hybrid will grow well when water is deficient or if the overall quality of the soil is poor. Water and soil quality go hand-in-hand, and the selection of corn hybrids should be based largely

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Farmers must be much more diligent in matching plant nutritional needs with the correct soil type and local weather patterns so the right level of nutrition is delivered at the right rate at the right time and right place.

on factors affecting individual fields such as water availability (whether a region is prone to drought or if irrigation is available) as well as the physical structure of the soil – organic matter, tilth and mineral content. In fact, many hybrids are marketed to select regions of the country based on the weather and soil conditions found there.

There’s more to choosing corn hybrids than how many days from planting to harvest or how densely a field can be planted. Because hybrids differ in their tolerance to high or low water availability and drainage, it’s important to take soil moisture and water-holding characteristics into account. Choices should take into consideration the porosity of the soil – whether the tilth and soil composition enables water to be absorbed, enabling roots to have little difficulty branching out as opposed to a soil that absorbs water poorly or has a layer of hard pan requiring a hybrid with a penetrating root structure.

As a result of improved agronomic, genetic and biotechnological advancements, yields of corn have reached record levels. But those greater yields have been accompanied by a significant decline in the organic content of the soil as well as soil macronutrient and micronutrient levels. Higher-yielding hybrids more rapidly deplete the soil of critical nutrients, leading to a decreasing fertility level in the soil.

This suggests farmers are not sufficiently matching nutrient uptake and removal from the soil with replacement fertilizers and amendments. In addition, the widespread practice of monoculture (planting the same crop in a field year after year) has resulted in a severe reduction in soil quality as well. Research has shown phosphorus, potassium, sulfur and zinc levels have decreased in the soils of many regions of the country. Soil health and quality have become a subject of much greater concern in recent years as it becomes evident that, like water, soil is a limited resource and can never be replaced once it’s destroyed.

So while farmers have the increasing options of choosing high-producing hybrids that may be drought- and disease-tolerant with days to maturation and harvest nearly a sure thing, poorly managed soil and nutrient management can quickly reduce advertised yields and tonnage.

It’s becoming increasingly more important to also understand what role soil, moisture and weather patterns play in the nutrient uptake at various stages of plant growth. Corn hybrids vary in their nutritional requirements at different stages of growth. Research has shown mineral and water uptakes vary during different stages of growth, and knowing when those stages occur will better enable a farmer to manage fertilizer applications and avoid waste.

This has been largely dictated by concerns over increasing environmental pollution by nitrogen, phosphorus and heavy metals in aquifers and waterways. Matching a hybrid with the proper soil type is becoming much more critical as critical resources such as water become scarcer and climate changes impact growing conditions.

Besides being concerned with maximizing crop yield that will result in a financial profit, a farmer must also focus on limiting pollution through the misuse and overuse of fertilizers. Farmers must be much more diligent in matching plant nutritional needs with the correct soil type and local weather patterns so the right level of nutrition is delivered at the right rate at the right time and right place.

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