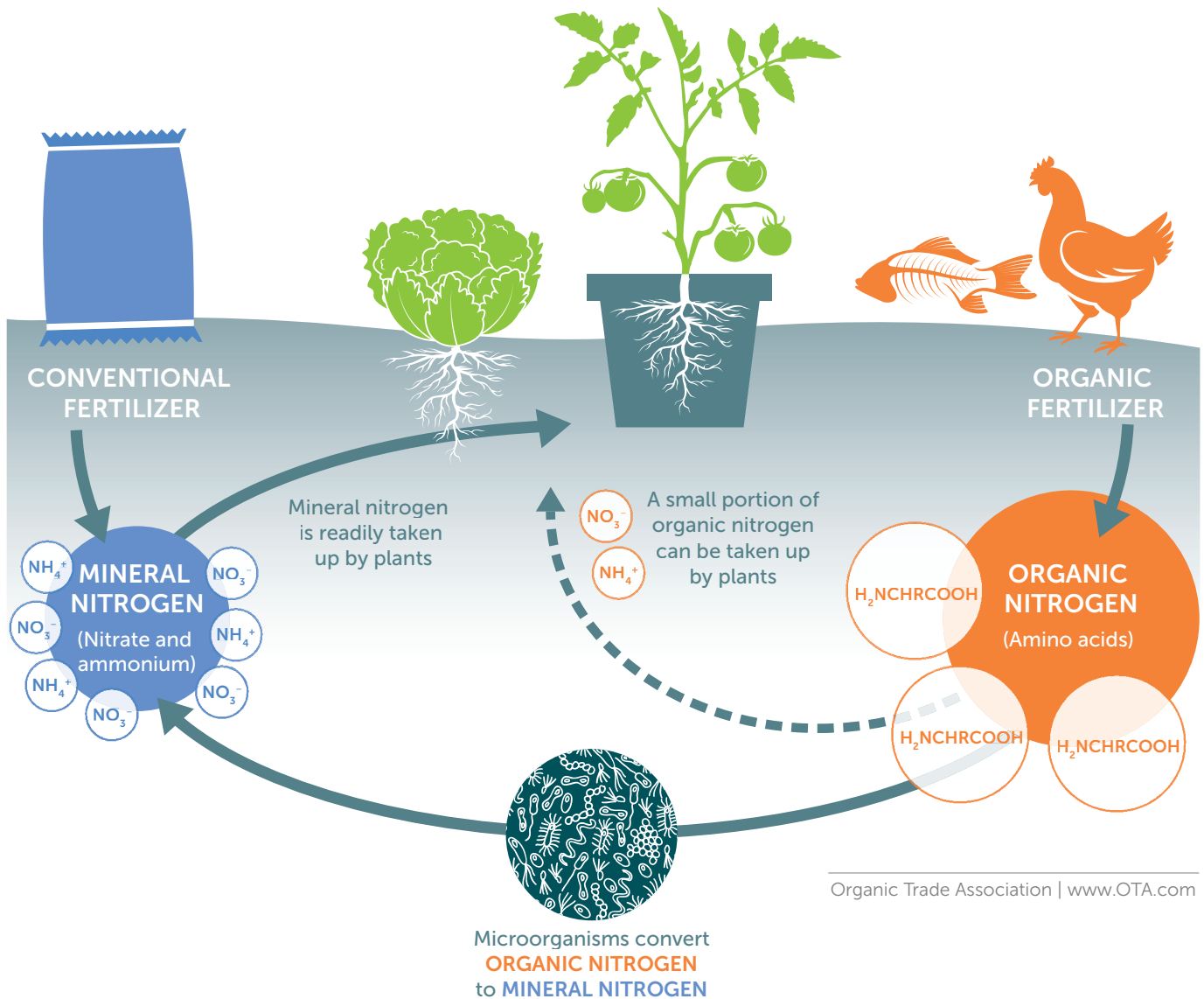


SPOTLIGHT: THE NITROGEN CYCLE IN ORGANIC FARMING SIMPLIFIED

FEEDING CROPS

Feeding crops is a critical element of any farming operation. The fundamental nutrition needs of crops must include providing plant-available nutrients, such as Nitrogen, Phosphorous, Potassium, Sulfur, and Calcium. Agricultural soils typically do not provide adequate quantities of these nutrients on their own, and producers must supply supplemental nutrients through the use of fertilizers and cover crops. Conventional producers typically accomplish this goal through the use of chemical fertilizers that deliver these nutrients in a form which is already plant-available. In the case of Nitrogen, plant-available forms are limited to Nitrate (NO_3^-) and Ammonium (NH_4^+). Conversely, organic producers typically feed their crops through the

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use of legume cover crops, which capture nitrogen gas from the atmosphere and transform it into plant-available nitrogen in the soil. Organic producers also rely on allowed forms of natural fertilizers such as manure and fish emulsion to deliver nutrition to the soil. There is a stark difference between chemical and natural fertilizers, however, in that natural fertilizers do not contain large amounts of Nitrate and Ammonium. The Nitrogen in these fertilizers typically takes the form of amino acids, which are the building blocks of proteins.

MINERALIZATION

For the amino acids contained in natural fertilizers to become available to plants, they first must be 'mineralized.' Mineralization is the conversion of an element (Nitrogen in this case) from an organic form (amino acids) to an inorganic state (Nitrate and Ammonia) as a result of microbial decomposition. Without this process, the fertilizers allowed in organic agriculture would not fulfil crops' nutrient needs resulting in lower yields and crop failures.

ROLE OF SOIL

The role of soil in facilitating the mineralization of nitrogen cannot be understated. Soil provides the habitat for microbes to decompose organic Nitrogen to mineral Nitrogen. This inter-connectedness between fertilizer, soil, microbes, and plants is what inspires the organic concept of "feed the soil, feed the plant." It is important to understand, however, that mineralization can occur outside of a soil structure. Introduction of the correct biology into a soil-less system, such as hydroponics or containerized production, can adequately address the need for microbes to mineralize natural fertilizers. In fact, without the presence of this biology, Nitrogen from natural fertilizers does not become plant-available, and crops suffer.

NATURAL FERTILIZERS

There are numerous sources of natural fertilizers allowed in organic production, and these products take many forms including solids like manure and liquids like fish emulsion. Regardless of whether the product is granular, liquid, or otherwise, the plant nutrients contained within the fertilizer are largely dependent on microbial activity to mineralize into a plant-available form.