Fertilizing Crops to Improve Human Health

16 macro and micronutrients are needed by crops, animals and humans

**Macronutrients**

- **Nitrogen (N)**: Essential component of all proteins. A deficiency often results in stunted growth.
- **Phosphorus (P)**: Second most abundant mineral in the body. Found in almost every food, and as such, deficiencies are rare. Required for proper cell functioning, regulation of calcium, strong bones and teeth, and to provide energy to our cells.
- **Potassium (K)**: An activator of enzymatic reactions. Potassium deficiency only occurs during prolonged fasting. Adverse effects with deficiency include cardiac arrhythmias, muscle weakness, and glucose intolerance.

**Percentage of soils deficient in each nutrient**

- **Nitrogen (N)**: 85%
- **Phosphorus (P)**: 73%
- **Potassium (K)**: 55%

**Micronutrients**

- **Zinc (Zn)**: Deficiency weakens the immune system. Essential in plant growth and gaining acceptance as an essential element for animals and humans.
- **Iron (Fe)**: A lack of iron is the most common nutritional disorder in humans worldwide, and is most prevalent in the developing world. Symptoms of iron deficiency include anaemia, poor growth and labored breathing after mild exercise.
- **Manganese (Mn)**: Deficiency has not been reported for humans. However, symptoms observed in livestock are impaired reproductive performance, skeletal deformities and shortened tendons.
- **Selenium (Se)**: Essential for animals or humans. Soil deficiencies lead to a decrease in plant productivity.

**Percentage of soils deficient in micronutrients**

- **Zinc (Zn)**: 49%
- **Iron (Fe)**: 23%
- **Manganese (Mn)**: 15%
- **Selenium (Se)**: 14%

**Other micronutrients**

- **Copper (Cu)**: An antioxidant for humans, copper is essential for the immune and nervous system, skeletal health, for iron metabolism and for the formation of red blood cells. Deficiencies lead to anemia.
- **Molybdenum (Mo)**: Though a rare genetic disorder, a deficiency of the molybdenum co-factor usually results in premature death in early childhood.
- **Iodine (I)**: Iodine deficiency disorders are cause of the mental impairment of nearly 20 million babies annually during pregnancy and the development of hypothyroidism (goitre).
- **Sulphur (S)**: Component of several amino acids essential to humans. Except for vegan diets, deficiencies are rare. Sulphur is needed for production of keratin and helps to keep hair, skin, bone, cartilage and tendons strong and healthy.

Macro and micronutrients are needed by crops, animals and humans