FACTSHEET NO.10

NUTRI-CHECK NET
OPTIMISING CROP NUTRITION

LAMMC
LITHUANIAN RESEARCH CENTRE FOR AGRICULTURE AND FORESTRY

CROP PRODUCTIVITY AND FACTORS ACTING ON IT

Problem

Increasing climate change evidence, such as moisture shortages and heat waves, will make Lithuania farmers difficult to achieve stable crop productivity in a mid-latitude climate zone.

Solution

Farmers are encouraged to pay attention to soil features, abiotic and biotic factors and their consequences during farming.

Outcome

Soil management, crop nutrition, plant physiology features are explained and possible ways to diminish climate change consequences in moderate climate zone.

Applicability box

Geographical coverage
Europe
Application period
N/A
Required time
N/A
Period of impact
Continuous
Equipment
Not Specific

Practical

There are 12 soil types found in Lithuania out of 24 registered in Europe. Although our country is small, it has a diversity of soil that determines not only the productivity of crops, but also the different possibilities to grow certain crops profitably.

Soil parameters such as pH, organic matter content and texture are best known to be able plants to take up nutrients from the soil. The most common in Lithuania is a low soil pH (acid soils), which can be adjusted in a more plant-friendly direction by liming the soil. Re-acidification of limed soils is much faster than that of naturally acidic soils due to warmer climate, the abundance of precipitation during the cold season, the use of physiologically acidic fertilizers, and the removal of basic cations removed with crop yield. Soil liming should be done to make acidity optimal to allow plants to make more efficient use of the nutrients in the soil and from fertilizers. Acidic soils (pH_{KCl} 4.6-5.0) must be limed at relatively low rates (2.0-4.0 t/ha of $CaCO_3$ of granulated lime) until the soil reaches the optimum pH_{KCl} level of 5.8-6.2, which must then be maintained by a systematic liming (0.5-1.0 t/ha $CaCO_3$) every year.

It is also important to maintain a stable level of organic matter in the soil. This requires the application of organic fertilizers such as manure and composts, as well as the cultivation of intercrops and perennial grasses. Spread liquid manure and slurry (where available) should be incorporated into the soil within 24 hours.

Water in the soil dissolves mineral and organic compounds, allowing plants to absorb nutrients from the soil. Water in plants carries the compounds formed during

photosynthesis throughout the plant. A lack of water at critical stages of plant growth (such as stems (tillering), inflorescences, and the formation and filling of grains)- can lead to lower yields. Sufficient moisture is also important for the plant during flowering. Plants need warm weather, but heat waves (temperatures above 30°C) stress plants by increasing respiration and transpiration. As respiration intensifies, the plant starts to use the compounds synthesized and stored during photosynthesis more rapidly and can exceed the rate of photosynthesis.

Plants are unique in their specific features to synthesize their own organic compounds from mineral sources. Plant nutrition requires carbon, oxygen and hydrogen, which the plant gets from air and water. In addition to these elements, plants need nitrogen, phosphorus, potassium, sulfur, calcium and magnesium. Like any living organism, plants also need trace elements such as iron, manganese, zinc, copper, boron, molybdenum, etc. The nutrient requirements are highest during the period of intense growth, when stems and foliage are forming. Plants can transfer some nutrients (potassium, phosphorus, magnesium) from the aging parts (leaves or other organs) to the still growing parts during the ageing process. The rates of crop fertilization should follow national recommendations based on soil analyses, crop type and target yield.

Another issue is therefore to look for opportunities offered by plant breeders of new varieties in the market which are somewhat resistant to dry air conditions. To be interested in research results, as well as adapting soil and crop management practices from the South European countries.

Further information

About this Factsheet

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NUTRI-CHECK NET is a Horizon Europe multi-actor project establishing a self-sustaining, multi-actor, Thematic Network called "NUTRI-CHECK NET" that builds farm-level adoption of best field-specific nutrient management practices across Europe. In nine countries, farmers' Crop Nutrition Clubs will identify and share the nature of their uncertainties about crop nutrition, their challenges and barriers to change. Decision systems and nutrition tools (including commercial products, services, and recent research outputs) will be assembled by national experts across Europe, including leading farmers, into a common online NUTRI-CHECK NET platform.
Check the project website: https://nutri-checknet.eu

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