Essential nutrients for Rice

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Rice Fact Sheet

Introduction

There are 17 essential elements needed for rice production. These may be supplied by the soil or added in the form of chemical or organic fertilizer. If any of these nutrients are in short supply the plant will not reach its yield potential. Depending upon the plant's total requirement, these essential elements are categorized into macro and micro elements. The macro elements are carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur. All of these are needed by plants in large amounts, often more than 0.1% of plant's dry weight.

The microelements are iron, zinc, manganese, copper, molybdenum, boron, nickel and chlorine. These are needed by plants in lesser quantities and are often referred to as trace elements. Sodium, selenium, silicon and vanadium are referred to as 'beneficial' elements.

Macro nutrients

Nutrient	Importance	Source	Deficiency
Nitrogen	Promotes rapid plant growth and improves grain yield and quality, through higher tillering, leaf area development, grain formation, grain filling, and protein synthesis	Urea, DAP, NPK complexes	Stunted yellowish plants with limited number of tillers. Symptoms appear in the older leaves.
Phosphorus	Formation of plant hormones and maintenance of membrane integrity, root development and promoting rapid growth of the plant especially during active tillering, early flowering, and it also hastens ripening and grain development.	DAP, SSP, NPK complexes	Stunted dark green plants with limited number of tillers
Potassium	Improves root growth and plant vigor, helps prevent lodging and enhances crop resistance to pests and diseases, osmoregulation in plants	Muriate of Potash (MoP), NPK complexes	Dark green plants with yellowish brown leaf margins or dark brown necrotic spots
Calcium	Helps promote normal root growth and development, constituent of cell wall	Lime/calcium carbonate	Leaves become white, rolled and curled
Magnesium	Constituent of chlorophyll involved in CO_2 assimilation and protein synthesis and also activates several essential enzymes	Magnesium sulphate and magnesium oxide	Pale-colored plants, with interveinal chlorosis first appearing on older leaves and later on the younger leaves
Sulfur	Essential component of plant structures and metabolism	Ammonium sulfate, gypsum and SSP, elemental sulphur	Yellowing of the whole plant with chlorosis being more pronounced in young leaves possibly with leaf tip necrosis

Micro nutrients

Nutrient	Importance	Deficiency
Iron	Essential plant nutrient required for electron transport in photosynthesis	Interveinal yellowing and chloric leaves that turn whitish and ultimately dead plants
Zn	Play important role in enzyme activation, protein synthesis, metabolism of carbohydrates, lipid, auxin	Dusty brown spots on upper leaves of stunted plants appearing 2-4 weeks after transplanting
Manganese	Enables the formation and stability of chloroplast, protein synthesis, nitrate reduction, and tricarboxylic cycle and helps reduce iron toxicity	Interveinal chlorosis which begins at the tip of the younger leaves
Boron	Plays a primary role in cell wall biosynthesis and structure as well as plasma membrane integrity	Reduced plant height, reduced or arrested panicle formation
Molybdenum	Primary role is reduction of nitrate to nitrite	Deficiency symptoms resemble to N deficiency
Copper	Plays a role in nitrogen, protein and hormone metabolism, photosynthesis, respiration, and pollen formation and fertilization	Blueish green leaves, which become chlorotic near the tip
Chlorine	Essential in photosynthesis	Chlorosis of younger leaves and wilting of plants
Nickel	Component of some plant enzymes, most notably urease, which metabolizes urea nitrogen into useable ammonia within the plant	toxic levels of urea can accumulate within the tissue forming necrotic legions on the leaf tips

Assam Agribusiness and Rural Transformation Project (APART)

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