

Nutrient functions and deficiency symptoms

Nitrogen (N)

- ✓ Promotes rapid growth (plant height and tiller number) and increased leaf size, spikelet number per panicle, percentage filled spikelets in each panicle, and grain protein content
- ✓ N deficiency occurs at critical growth stages: tillering and panicle initiation

Deficiency symptoms

- plants are stunted and yellowish
- reduced tiller number
- small, narrow; erect leaves turn yellowish-red and brown
- old leaves become light straw-colored that later wither



Phosphorus (P)

- ✓ Promotes tillering, root development, early flowering, and ripening (especially when temperature is low)
- ✓ Particularly important in early growth stages
- ✓ P deficiency is often associated with other nutrient disorders such as iron toxicity and low pH

Deficiency symptoms

- stunted with greatly reduced tiller number, erect stem and leaves
- young leaves are normal; old leaves turn brown and die
- number of leaves, panicles, and grains per panicle is also reduced
- leaves appear pale green when P and N deficiencies occur simultaneously



Potassium (K)

- ✓ Delays leaf senescence, and therefore contributes to greater canopy photosynthesis and crop growth
- ✓ Improves root growth and plant vigor and helps prevent lodging
- ✓ enhances crop resistance to pests and increases number of spikelets per panicle, percentage filled grains, and 1,000-grain weight
- ✓ K deficiency symptoms appear during the later growth stages of the plant

Deficiency symptoms

- stunted, slightly reduced tillering
- upper leaves are short, droopy, and “dirty” dark green (discoloration gradually appears on younger leaves)
- yellowish brown leaf margins are similar to those of tungro virus diseases
- rusty brown spots appear on the tips of older leaves causing it to turn brown and dry up



Sulfur (S)

- ✓ involved in chlorophyll production
- ✓ required for protein synthesis, plant function and structure
- ✓ effect on yield is more pronounced when S deficiency occurs during vegetative growth

Deficiency symptoms

- yellowing of the whole plant
- chlorosis is more pronounced in young leaves; the tips may become necrotic
- yellowish seedlings in seedbed
- high seedling mortality after transplanting
- stunted growth (plants are not dark-colored as in P or K deficiency)
- reduced tiller number, fewer and shorter panicles
- reduced number of spikelets per panicle
- delayed maturity



Zinc (Zn)

- ✓ essential element in chlorophyll production in the rice plant
- ✓ Zn deficiency is the most wide-spread micronutrient-related problem in rice
- ✓ Symptoms appear from two to four weeks after transplanting
- ✓ Rice plants can recover from symptoms soon after the field is drained

Deficiency symptoms

- dusty brown spots on old leaves
- stunted plant growth
- patches of poorly established hills in the field

Severe Zn deficiency

- decreases or stops tillering
- increases time to crop maturity
- increases spikelet sterility



*Photo courtesy of IRRI

Source: PalayCheck System for Irrigated Lowland Rice. Philippine Rice Research Institute. ©2007