

Phosphorus Deficiency Symptoms in Some Crops

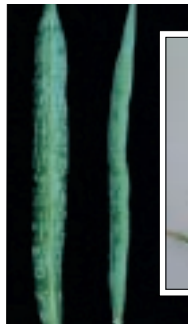
The classic deficiency symptoms for phosphorus (P) or other nutrients in crops can be described, but they may not always be so obvious in the field. Sometimes, other conditions can complicate the appearance and cause difficulty in diagnosis. For example, herbicide effects, insect

damage, weather, or soil conditions are common field problems and can be related to nutrient deficiency or toxicity. Interactions involving more than one nutrient may also affect appearance of symptoms.

Following are photos and descriptions of P deficiency for several major crops.



Alfalfa: Symptoms of P deficiency in alfalfa may include dark green or purplish leaves, with tip death in some cases. Upward tilting of leaflets and stunted growth may occur. Reduced nodulation and increased winterkill may be other consequences. Alfalfa plants deficient in P may appear water stressed. The photo at left above shows alfalfa in a plot fertilized with P. The photo at right above shows severe P deficiency in alfalfa



Canola: Phosphorus deficiency restricts root and top growth in canola. Mildly deficient plants are small, but appear normal. With more severe deficiency, the root system is poorly developed and stems are thin and erect with few branches and small, narrow leaves. Leaves and stems may develop a purplish discoloration, or leaves may become a dark bluish-green. In the photos shown here, P-sufficient plants and pods are on the left, P-deficient on the right.

Corn: Inadequate P may result in dark green plants with reddish-purple tips and leaf margins. It is more likely to appear on young plants, especially on soils that are cold, wet, or too dry. The purple color does not necessarily signal P deficiency, because that is the normal appearance in some hybrids. Some hybrids may be deficient without obvious symptoms.



Cotton: Deficient plants may be stunted, with leaves darker green than normal. Flowering may be delayed and boll retention poor. Premature senescence of leaves may occur on P-deficient plants later in the season. Deficiency does not usually occur in early growth of cotton.

Grapes: Deficiency of P has not been a widespread problem in vineyards. Where symptoms have been observed, they are variable depending on variety. In white varieties the primary and secondary veins remain green while the interveinal tissue becomes chlorotic. Symptoms first appear on the leaf margin. In red grapes interveinal tissue yellows and turns red, producing islands of red tissue surrounded by yellow-green veins. Few grapes clusters form per vine, are small with poor set, and shot berries.



Potatoes: Stunted growth and dark green color may be signs of P deficiency. Leaf roll and upward cupping of leaf blades sometimes occur as severity of deficiency increases. Symptoms are more likely when soil temperatures are relatively low. Phosphorus deficiency is more frequent on acid and calcareous soils or on kaolinitic soils.



Rice: Phosphorus deficiency does not always show a distinct purple color in rice and other grass plants. Symptoms may be observed in seedling rice as severe stunting, small diameter stems, and lack of tillering. The dark green color of deficient leaves can vary to light green or yellow, lighter leaf colors being associated with cool temperatures.

Sorghum: Plants deficient in P appear stunted and may be spindly, with low vigor. Dark green leaves may also show dark red color. Leaf tips and interveinal tissue show redness that progresses toward the base, veinal tissue, and midrib. The entire leaf may become red. With more severe deficiency, leaves turn pale brown and die, and roots may turn dark and discolored.



Sugarcane: Because P is mobile in the plant, deficiency usually occurs first in older tissues. Distinct symptoms are not always obvious. The main effect of deficiency is retarded growth. Older leaves may turn yellow and eventually die back from tips and along margins.

Soybeans: Phosphorus is required for normal fixation of nitrogen (N) in soybeans. Relatively large amounts of P are needed, especially at pod set. Uptake of P may be reduced in cool, wet soils; deficiency symptoms are not always clear. Leaves may turn dark green or bluish green, and the leaf blade may curl up and appear pointed. Phosphorus deficiency can delay blooming and maturity.



Turfgrasses: Phosphorus is critical to the establishment of most turfgrasses. Various turfgrass species respond differently to seedbed P application and have differing requirements. Common bermudagrass seedlings are shown here in P-deficient conditions.

Wheat: Wheat and other small grains deficient in P tend to be stressed and more susceptible to root diseases. Deficient plants may maintain a healthy-looking green color, but grow slowly and mature late. Leaf tips may die back when deficiency is severe, and some varieties may show shades of purple or red.

