

Starter Phosphorus And Potassium For Cold Soils

NORCROSS, Ga – Early spring seeding of cereal, oilseed, and pulse crops is critical to optimizing grain yields. Along with shallow placement of high quality seed, seed zone fertility for immobile nutrients such as phosphorus and potassium is important to giving the young seedling a good start.

Phosphorus and potassium are transported to roots largely by diffusion, the movement of nutrients to the plant root down a concentration gradient. As the phosphorus and potassium concentrations around roots are depleted by plant uptake, the solid phase components of soil replenish the soil solution. Diffusion is a short-range process, dependent on soil moisture and temperature conditions. The colder the soil, the slower phosphorus and potassium will diffuse, the slower that plant roots grow, and the slower phosphorus and potassium will be taken up by the crop. No-till production systems increase the amount of water stored at the surface of most soils by maintaining surface residue cover. While improved soil water leads to increased yield potential, it slows the warming of the soil in the early spring.

Early season phosphorus and potassium deficiencies affect seedling development. A poorly devel-

oped root system in the absence of adequate available phosphorus and potassium results in slow growth, reduced leaf size and tiller formation, reduced grain filling, and ultimately lower grain yields. Starter fertilizer placed near the seed ensures an abundant supply of phosphorus and potassium for crop uptake early in the growing season. It also is critical to balancing ever increasing nitrogen rates being used by farmers to achieve improved profitability.

Phosphorus is well known for promotion of early root growth and root system expansion, but potassium may be of even greater importance to root development. Cereal plants have two root systems: the seminal roots that emerge from the germinating seed and the nodal roots that develop from the crown to support advanced leaf and tiller formation. Surface soil potassium deficiency affects both of these root systems: however, it can have the greatest impact on formation of nodal roots critical to survival of tillers. High spring cereal yields are dependent on the early establishment and survival of primary tillers.

Root and leaf disease of cereal seedlings can be a further stress on crop establishment with early seeding dates. Research has shown that

both phosphorus and potassium fertilization can be effective in reducing root diseases of spring wheat and barley. Take-all in wheat was reduced by 50 percent with seed-placed phosphorus, while root rot severity in barley was reduced by 10 percent in Saskatchewan research. In Alberta, barley grain yield losses due to root rot were reduced from 40 percent to 30 percent with the addition of phosphorus in the seedrow.

Should potassium be applied to high potassium soils? We cannot ignore our soil test results. If they indicate high potassium levels, a response to potassium fertilizer addition is unlikely. However, if yields are lower than expected, and crops are seeded into cold soils early in the spring, addition of potassium

to starter fertilizers may go a long way in improving seedling vigor and early crop development.

The "art of farming" involves the integration of management practices and crop production inputs to maximize yields every year. Ensuring that a crop has a balance of plant-available nutrients from seedling establishment through to grain filling is critical to capitalizing on best management practices such as early seeding on the Canadian prairies.

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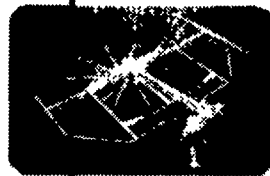
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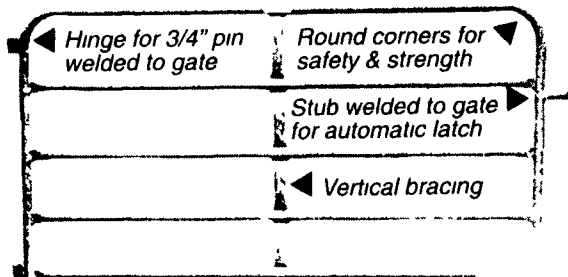
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